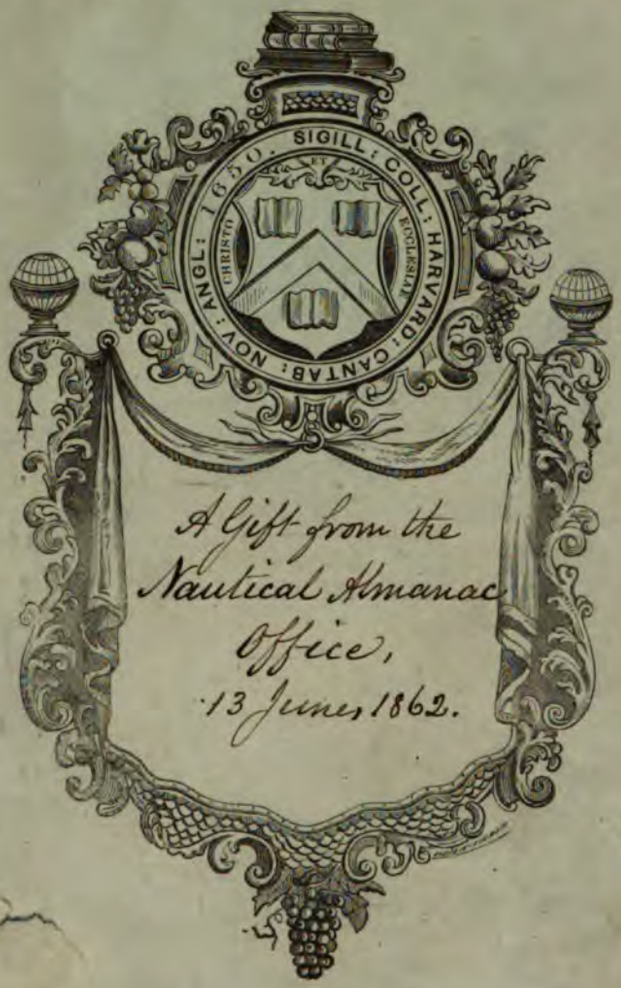
TABLES

OF

MELPOMENE



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13 June 1862.

TABLES

OF

MELPOMENE,

BY

Ernst
E. SCHUBERT., 1813-1873

COMPUTED FOR THE

AMERICAN EPHEMERIS AND NAUTICAL ALMANAC,

UNDER THE SUPERINTENDENCE OF

COMMANDER CHARLES HENRY DAVIS, U. S. N.

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REPORT

TO

COMMANDER C. H. DAVIS, U. S. N.

I. ON THE COMPUTATION OF THE GENERAL PERTURBATIONS OF MELPOMENE BY JUPITER.

By ERNEST SCHUBERT.

FOR the computation of these perturbations, Professor ENCKE's method, published in the *Berliner Jahrbuch* for 1857, has been used in order to try it by a complete application to a special case. The basis of the work are the following elements: —

Melpomene. 1854, Jan. 0, Washington Mean Time; (osculating).			Jupiter (from Bouvard's Tables). 1854, Jan. 0, Washington Mean Time.
M = 79° 56′ 36.″81			M = 269° 43′ 39.″1
π = 15 14 31.52 } M. Eq. Ep.	π' = 16 16 53.3 } referred to the Equator.		π = 11 58 43.2 } M. Eq. Ep.
Ω = 150 1 8.21 } M. Eq. Ep.	Ω' = 19 16 43.7 } referred to the Equator.		Ω = 98 56 38.7 } M. Eq. Ep.
i = 10 9 4.77	i' = 15 28 17.2 } referred to the Equator.		i = 1 18 39.5
φ = 12 32 46.29			φ = 2 45 55.1
μ = 1019″.96852			μ = 299″.12861
$\log a$ = 0.3609465			$\log a$ = 0.7162370

The plane of the orbit of Melpomene has been adopted for the fundamental plane, and the major axis for the line of the abscissas. The orbit of Jupiter is referred to this fundamental plane by means of the formulas on page 390 (*Jahrbuch* for 1857).

Now for the computation of $\frac{m' \kappa^2}{\rho^{03}}$ the periphery was divided into 16 parts, so that M and M' (the mean anomalies of Melpomene and Jupiter) for those 16 points are 0°, 22°.5, 45°, &c. Log $m' \kappa^2 = 5.5760322$ in units of the seventh decimal-place, and for the Julian year as the unit of time. Each point of the Melpomene orbit is combined with all 16 points of the Jupiter orbit, which gives $16 \times 16 = 256$ values of $\frac{m' \kappa^2}{\rho^{03}}$. On page 354, Professor ENCKE says that those values can be checked only by double calculation, since it cannot be done by the differences in the series obtained for the different M. But I found that, if we arrange the quantities $\frac{m' \kappa^2}{\rho^{03}}$ according to another principle, they can be tested by differences, which will be shown by the following: —

A.							B.				
$M' =$	0°	22°.5	45°	67°.5	90°	etc.					
$\frac{m' \kappa^2}{\rho^{03}}$	11776.2	9701.8	$M = 0°$ 5823.7	3385.1	2150.3						11776.2
										7454.2	11195.8
									3722.0	6636.6	10851.5
			$M = 22°.5$					2117.7	3515.1	6418.2	11154.1
	7454.2	11195.8	10838.6	7038.9	4099.4		1419.6	2110.9	3583.5	6753.7	12234.1
			$M = 45°$				⋮	⋮	⋮	⋮	⋮
	3722.0	6636.6	10851.5	12032.8	8415.1						
			$M = 67°.5$							22.5 & 0	0 & 0
	2117.7	3515.1	6418.2	11154.1	13455.3					45 & 22.5	22.5 & 22.5
			$M = 90°$							67.5 & 45	45 & 45
	1419.6	2110.9	3583.5	6753.7	12234.1				etc.	Diff. = 22.5	Diff. = 0
			etc.								

This sketch needs no further explanation; the principle for the arrangement in B from A is very simple, and it is obvious that it is the vertical series in B which can be tested by differences.

In Table A the values of $\frac{m' \kappa^2}{\rho^{03}}$ are functions of M', and they are developed in series of the form,

$$\frac{m' \kappa^2}{\rho^{03}} = a^\circ + a' \cos M' + b' \sin M' + a'' \cos 2 M' + b'' \sin 2 M'.$$

It is evident that now in these series the coefficients are functions of M, and they must be developed in series of the same form, that is, for instance,

$$a^\circ = \alpha^\circ + \alpha' \cos M + \beta' \sin M + \alpha'' \cos 2 M + \beta'' \sin 2 M.$$

Each of the latter series must be multiplied with the $\cos i' M'$ or $\sin i' M'$ belonging to it, and then, finally, by resolving the products of two cosines or sines into sums and differences, we obtain $\frac{m' \kappa^2}{\rho^{03}}$ developed in series of the general form

$$a_i'' \cos (i M - i' M') + b_i'' \sin (i M - i' M').$$

In order to have throughout $-i' M'$ we only have to change the sign of i' and that of the coefficient of the sine.

The formulas for the components of the disturbing force (page 392) are:—

$$X_1 = m' \kappa^2 \left\{ \left(\frac{1}{\rho^{03}} - \frac{1}{r'^3} \right) x'_1 - \frac{x_1}{\rho^{03}} \right\}$$

$$Y_1 = m' \kappa^2 \left\{ \left(\frac{1}{\rho^{03}} - \frac{1}{r'^3} \right) y'_1 - \frac{y_1}{\rho^{03}} \right\}$$

$$Z_1 = m' \kappa^2 \left\{ \left(\frac{1}{\rho^{03}} - \frac{1}{r'^3} \right) z'_1 \right\}$$

Therefore, after having developed $\frac{m' \kappa^2}{\rho^{03}}$ according to the above precepts, we subtract from it

$$\frac{m' \kappa^2}{r'^3} = 2684.3 + 388.2 \cos M' + 28.1 \cos 2 M' + 2.0 \cos 3 M' + 0.1 \cos 4 M'$$

and get thus $m' \varkappa^2 \left(\frac{1}{\rho^{cs}} - \frac{1}{r^{cs}}\right)$. This periodical series is to be multiplied successively with x'_1, y'_1, and z'_1; developed also in periodical series they are: —

$$\begin{aligned} x'_1 = -0.37409 &+ 5.16475 \cos M' &&+ 0.25210 \sin M' \\ &+ 0.12450 \cos 2M' &&+ 0.00608 \sin 2M' \\ &+ 0.00450 \cos 3M' &&+ 0.00022 \sin 3M' \\ &+ 0.00019 \cos 4M' \end{aligned}$$

$$\begin{aligned} y'_1 = +0.02313 &- 0.31933 \cos M' &&+ 5.14340 \sin M' \\ &- 0.00770 \cos 2M' &&+ 0.12401 \sin 2M' \\ &- 0.00028 \cos 3M' &&+ 0.00446 \sin 3M' \\ & &&+ 0.00019 \sin 4M' \end{aligned}$$

$$\begin{aligned} z'_1 = -0.03518 &+ 0.49693 \cos M' &&+ 0.68709 \sin M' \\ &+ 0.01336 \cos 2M' &&+ 0.01657 \sin 2M' \\ &+ 0.00185 \cos 3M' &&+ 0.00060 \sin 3M' \\ &+ 0.00144 \cos 4M' \\ &+ 0.00142 \cos 5M' \\ &+ 0.00142 \cos 6M' \\ &+ 0.00142 \cos 7M' \\ &+ 0.00071 \cos 8M' \end{aligned}$$

After that, the periodical series $\frac{m' \varkappa^2}{\rho^{cs}}$ must be multiplied with $-x_1$ and y_1.

We have

$$\begin{aligned} -x_1 = +0.74808 &- 2.25537 \cos M \\ &- 0.24159 \cos 2M \\ &- 0.03886 \cos 3M \\ &- 0.00741 \cos 4M \\ &- 0.00155 \cos 5M \\ &- 0.00035 \cos 6M \end{aligned} \qquad \begin{aligned} -y_1 = &- 2.22785 \sin M \\ &- 0.23961 \sin 2M \\ &- 0.03861 \sin 3M \\ &- 0.00737 \sin 4M \\ &- 0.00155 \sin 5M \\ &- 0.00035 \sin 6M \end{aligned}$$

Finally, after these five multiplications, by forming the sums, we obtain the series for X_1, Y_1, Z_1.

I subjoin here now the terms of $\frac{m' \varkappa^2}{\rho^{cs}}$ and of $m' \varkappa^2 \left(\frac{1}{\rho^{cs}} - \frac{1}{r^{cs}}\right)$ retained for multiplication, the terms smaller than 0.5 having been omitted.

$\frac{m' \varkappa^2}{\rho^{cs}}$

i, i'	cos	sin	i, i'	cos	sin	i, i'	cos	sin	i, i'	cos	sin
0 0	+4348.2	0.0	−4 −1	− 7.3	0.0	6 −1	+ 5.6	− 5.8	−2 −2	− 1.1	+ 0.5
1 0	− 602.6	+25.8	−3 −1	+ 6.3	− 1.6	7 −1	− 2.7	+ 6.6	−1 −2	− 14.0	− 8.8
2 0	+ 19.8	−60.9	−2 −1	− 6.0	+ 2.8	8 −1	0.0	− 3.7	0 −2	+ 195.3	+ 33.7
3 0	+ 1.3	− 5.1	−1 −1	+ 109.0	+ 64.1				1 −2	−1174.9	+156.8
4 0		− 1.6	0 −1	−1384.0	+ 90.2	−8 −2	0.0	+ 0.5	2 −2	+2618.4	−301.3
			1 −1	+5208.0	−305.3	−7 −2	+ 0.5	− 1.1	3 −2	+ 350.1	− 13.4
−8 −1	0.0	− 3.7	2 −1	+ 185.2	+ 26.4	−6 −2	− 0.8	+ 0.7	4 −2	+ 77.3	− 27.7
−7 −1	+ 2.9	+ 6.7	3 −1	+ 48.1	− 43.1	−5 −2	+ 1.0	− 0.5	5 −2	+ 16.1	− 8.6
−6 −1	− 5.2	− 5.1	4 −1	+ 18.5	− 7.9	−4 −2	− 1.2	0.0	6 −2	+ 4.7	− 1.5
−5 −1	+ 6.6	+ 2.9	5 −1	− 4.4	+ 0.8	−3 −2	+ 0.9	+ 0.5	7 −2	0.0	− 1.7

$$\frac{m' \kappa^2}{\rho^{cs}}$$

i,	i'	cos	sin	i,	i'	cos	sin	i,	i'	cos	sin	i,	i'	cos	sin
8	−2	0.0	+ 0.5	−2	−4	+ 0.8	+ 1.1	6	−5	+ 96.3	− 21.5	−5	−7	+ 5.3	+ 2.6
				−1	−4	− 1.1	− 1.8	7	−5	+ 38.0	− 11.8	−4	−7	− 7.4	0.0
−8	−3	+ 0.5	+ 1.2	0	−4	+ 3.0	+ 3.7	8	−5	+ 4.5	− 1.2	−3	−7	+ 6.8	− 3.0
−7	−3	− 0.9	− 2.9	1	−4	− 31.4	− 5.3					−2	−7	− 5.3	+ 5.3
−6	−3	+ 2.0	+ 2.1	2	−4	+ 158.1	− 19.3	−8	−6	+ 12.7	− 1.2	−1	−7	+ 2.4	− 6.7
−5	−3	− 2.8	− 1.2	3	−4	− 447.7	+120.2	−7	−6	+ 4.4	− 5.8	0	−7	0.0	+ 7.4
−4	−3	+ 2.8	0.0	4	−4	+ 506.8	−117.6	−6	−6	+ 2.7	0.0	1	−7	− 3.1	− 6.5
−3	−3	− 2.9	+ 1.1	5	−4	+ 181.6	− 30.1	−5	−6	+ 1.2	− 1.0	2	−7	+ 4.3	+ 5.1
−2	−3	+ 1.8	− 2.4	6	−4	+ 52.8	− 15.4	−4	−6	− 1.0	0.0	3	−7	− 2.3	− 2.7
−1	−3	0.0	+ 4.8	7	−4	+ 14.7	− 4.9	−3	−6	+ 0.9	0.0	4	−7	− 6.7	+ 4.7
0	−3	− 27.6	− 12.0	8	−4	+ 2.2	− 1.6	−2	−6	− 1.1	− 0.8	5	−7	+ 33.9	− 11.6
1	−3	+ 202.1	+ 1.6					−1	−6	0.0	+ 1.0	6	−7	− 45.4	+ 23.5
2	−3	− 778.5	+153.7	−8	−5	+ 4.5	− 1.2	0	−6	0.0	− 1.0	7	−7	+ 23.5	− 2.9
3	−3	+1199.2	−205.2	−7	−5	+ 2.8	− 4.0	1	−6	− 1.2	+ 0.8	8	−7	+ 6.9	− 10.9
4	−3	+ 282.1	− 30.9	−6	−5	+ 2.6	+ 1.5	2	−6	+ 5.7	0.0				
5	−3	+ 73.9	− 21.2	−5	−5	− 2.5	− 1.5	3	−6	− 22.5	+ 4.0	−8	−8	+ 3.6	0.0
6	−3	+ 15.1	− 5.3	−4	−5	+ 2.9	0.0	4	−6	+ 68.9	− 20.7	−7	−8	− 6.9	− 8.9
7	−3	+ 5.8	− 4.7	−3	−5	− 2.8	+ 1.1	5	−6	− 116.8	+ 48.6	−6	−8	+ 13.0	+ 3.8
8	−3	+ 0.5	+ 1.2	−2	−5	+ 1.9	− 2.1	6	−6	+ 75.3	− 25.2	−5	−8	− 3.6	− 2.4
				−1	−5	− 1.3	+ 2.8	7	−6	+ 46.2	− 18.2	−4	−8	+ 1.9	0.0
−8	−4	+ 2.2	− 1.6	0	−5	− 0.8	− 3.2	8	−6	+ 12.7	− 1.2	4	−8	+ 1.9	0.0
−7	−4	0.0	+ 0.8	1	−5	+ 5.7	+ 4.3					5	−8	− 3.6	+ 2.4
−6	−4	+ 1.3	− 1.2	2	−5	− 30.7	− 1.1	−8	−7	+ 6.9	− 10.9	6	−8	+ 13.0	− 3.8
−5	−4	− 1.4	+ 0.6	3	−5	+ 111.6	− 23.4	−7	−7	+ 24.3	+ 8.4	7	−8	− 6.9	+ 8.9
−4	−4	+ 1.5	0.0	4	−5	− 240.3	+ 80.8	−6	−7	− 6.4	− 9.8	8	−8	+ 3.6	0.0
−3	−4	− 1.6	− 0.6	5	−5	+ 204.6	− 59.9								

$$m' \kappa^2 \left(\frac{1}{\rho^{cs}} - \frac{1}{r^{cs}} \right)$$

i',	i	cos	sin	i',	i	cos	sin	i',	i	cos	sin	i',	i	cos	sin
0	0	+1663.9	0.0	6	−1	− 1.2	− 0.8	−4	−3	− 1.6	− 0.6	1	−4	+ 18.5	+ 7.9
1	0	−1772.6	− 90.2	7	−1	− 3.1	+ 6.5	−3	−3	− 2.9	+ 1.1	2	−4	+ 77.3	+ 27.7
2	0	+ 167.2	− 33.7					−2	−3	+ 0.9	+ 0.5	3	−4	+ 282.1	+ 30.9
3	0	− 29.6	+ 12.0	−7	−2	− 5.3	+ 5.3	−1	−3	+ 6.3	− 1.6	4	−4	+ 506.8	+117.6
4	0	+ 2.9	− 3.7	−6	−2	− 1.1	− 0.8	0	−3	+ 1.3	+ 5.1	5	−4	− 240.3	− 80.8
5	0	− 0.8	+ 3.2	−5	−2	+ 1.9	− 2.1	1	−3	+ 48.1	+ 43.1	6	−4	+ 68.9	+ 20.7
6	0	0.0	+ 1.0	−4	−2	+ 0.8	+ 1.1	2	−3	+ 350.1	+ 13.4	7	−4	− 6.7	− 4.7
7	0	0.0	− 7.4	−3	−2	+ 1.8	− 2.4	3	−3	+1199.2	+205.2	8	−4	+ 1.9	0.0
				−2	−2	− 1.1	+ 0.5	4	−3	− 447.7	−120.2				
−7	−1	+ 2.4	− 6.7	−1	−2	− 6.0	+ 2.8	5	−3	+ 111.6	+ 23.4	−8	−5	− 3.6	− 2.4
−6	−1	0.0	+ 1.0	0	−2	+ 19.8	+ 60.9	6	−3	− 22.5	− 4.0	−7	−5	+ 5.3	+ 2.6
−5	−1	− 1.3	+ 2.8	1	−2	+ 185.2	− 26.4	7	−3	− 2.3	+ 2.7	−6	−5	+ 1.2	− 1.0
−4	−1	− 1.1	− 1.8	2	−2	+2618.4	+301.3					−5	−5	− 2.5	− 1.5
−3	−1	0.0	+ 4.8	3	−2	− 778.5	−153.7	−8	−4	+ 1.9	0.0	−4	−5	− 1.4	+ 0.6
−2	−1	− 14.0	− 8.8	4	−2	+ 158.1	+ 19.3	−7	−4	− 7.4	0.0	−3	−5	− 2.8	− 1.2
−1	−1	+ 109.0	+ 64.1	5	−2	− 30.7	+ 1.1	−6	−4	− 1.0	0.0	−2	−5	+ 1.0	− 0.5
0	−1	− 602.6	− 25.8	6	−2	+ 5.7	0.0	−5	−4	+ 2.9	0.0	−1	−5	+ 6.6	+ 2.9
1	−1	+5208.0	+305.3	7	−2	+ 4.3	− 5.1	−4	−4	+ 1.5	0.0	0	−5	0.0	0.0
2	−1	−1174.9	−156.8					−3	−4	+ 2.8	0.0	1	−5	− 4.4	− 0.8
3	−1	+ 202.1	− 1.6	−7	−3	+ 6.8	− 3.0	−2	−4	− 1.2	0.0	2	−5	+ 16.1	+ 8.6
4	−1	− 31.4	+ 5.3	−6	−3	+ 0.9	0.0	−1	−4	− 7.3	0.0	3	−5	+ 73.9	+ 21.2
5	−1	+ 5.7	− 4.3	−5	−3	− 2.8	+ 1.1	0	−4	0.0	+ 1.6	4	−5	+ 181.6	+ 30.1

$$m' x^2 \left(\frac{1}{\rho^{\cos}} - \frac{1}{r^{\cos}}\right)$$

i', i	cos	sin	i', i	cos	sin	i', i	cos	sin	i', i	cos	sin
5 −5	+ 204.6	+ 59.9	2 −6	+ 4.7	+ 1.5	−1 −7	+ 2.9	+ 6.7	−5 −8	+ 4.5	− 1.2
6 −5	− 116.8	− 48.6	3 −6	+ 15.1	+ 5.3	0 −7	0.0	0.0	−4 −8	+ 2.2	− 1.6
7 −5	+ 33.9	+ 11.6	4 −6	+ 52.8	+ 15.4	1 −7	− 2.7	− 6.6	−3 −8	+ 0.5	+ 1.2
8 −5	− 3.6	− 2.4	5 −6	+ 96.3	+ 21.5	2 −7	0.0	+ 1.7	−2 −8	0.0	+ 0.5
			6 −6	+ 75.3	+ 25.2	3 −7	+ 5.8	+ 4.7	−1 −8	0.0	− 3.7
−8 −6	+ 13.0	+ 3.8	7 −6	− 45.4	− 23.5	4 −7	+ 14.7	+ 4.9	0 −8	0.0	0.0
−7 −6	− 6.4	− 9.8	8 −6	+ 13.0	+ 3.8	5 −7	+ 38.0	+ 11.8	1 −8	0.0	+ 3.7
−6 −6	+ 2.7	0.0				6 −7	+ 46.2	+ 18.2	2 −8	0.0	− 0.5
−5 −6	+ 2.6	+ 1.5	−8 −7	− 6.9	− 8.9	7 −7	+ 23.5	+ 2.9	3 −8	+ 0.5	− 1.2
−4 −6	+ 1.3	− 1.2	−7 −7	+ 24.3	+ 8.4	8 −7	− 6.9	− 8.9	4 −8	+ 2.2	+ 1.6
−3 −6	+ 2.0	+ 2.1	−6 −7	+ 4.4	− 5.8				5 −8	+ 4.5	+ 1.2
−2 −6	− 0.8	+ 0.7	−5 −7	+ 2.8	− 4.0	−8 −8	+ 3.6	0.0	6 −8	+ 12.7	+ 1.2
−1 −6	− 5.2	− 5.1	−4 −7	0.0	+ 0.8	−7 −8	+ 6.9	− 10.9	7 −8	+ 6.9	+ 10.9
0 −6	0.0	0.0	−3 −7	− 0.9	− 2.9	−6 −8	+ 12.7	− 1.2	8 −8	+ 3.6	0.0
1 −6	+ 5.6	+ 5.8	−2 −7	+ 0.5	− 1.1						

Retained Terms of the Forces.

i, i'	X_1		Y_1		Z_1		i, i'	X_1		Y_1		Z_1	
	cos	sin	cos	sin	cos	sin		cos	sin	cos	sin	cos	sin
0 0	− 1273.1	0.0	+ 66.7	0.0	− 550.6	0.0	3 −2	+ 441.0	− 143.0	− 64.6	+ 280.1	+ 356.7	+ 329.5
1 0	+ 3707.8	− 224.0	− 180.6	+ 3507.2	+1456.4	+1647.6	4 −2	+ 149.4	− 0.2	− 20.1	+ 51.7	+ 82.3	+ 85.8
2 0	+ 271.4	+ 29.2	− 61.0	+ 290.6	+ 40.6	+ 95.4	5 −2	+ 23.8	− 9.4	+ 11.4	+ 46.9	+ 25.9	+ 23.3
3 0	+ 55.1	− 36.5	+ 43.1	+ 22.9	+ 33.4	+ 6.7	6 −2	+ 15.9	− 12.6	− 16.2	− 13.1		
4 0	+ 11.6	− 7.4	+ 7.5	+ 49.4	+ 7.8	+ 7.2	7 −2	− 1.5	+ 7.7	+ 24.8	+ 11.7		
5 0	+ 1.2	− 3.8	− 13.1	− 31.6			8 −2	− 1.2	− 3.9	− 15.0	− 0.1		
6 0	+ 1.8	0.0	+ 27.5	+ 27.0									
7 0	− 1.1	− 1.1	− 34.1	− 14.4			−3 −3	− 7.0	+ 2.2	+ 4.8	− 8.8		
8 0	+ 1.0	0.0	+ 19.0	0.0			−2 −3	+ 0.3	− 1.2	− 4.2	+ 6.7		
							−1 −3	− 18.7	− 6.4	− 3.9	+ 10.7		
−5 −1	+ 17.4	+ 4.8	− 3.7	+ 1.3			0 −3	+ 174.3	+ 60.3	+ 50.5	− 170.8	+ 60.7	− 32.6
−4 −1	− 19.3	+ 1.9	+ 7.6	− 3.4			1 −3	−1941.3	+ 366.8	+ 416.3	+1909.7	− 252.3	+ 387.8
−3 −1	+ 21.1	+ 4.8	+ 2.7	+ 0.2			2 −3	+5242.4	− 845.2	− 952.4	−5136.7	+ 641.7	− 935.1
−2 −1	+ 6.9	+ 79.6	+ 72.3	− 30.3	+ 33.6	+ 6.8	3 −3	+ 715.6	− 40.8	− 93.8	− 902.6	− 120.1	− 238.2
−1 −1	− 298.8	− 56.1	− 5.9	+ 290.8	− 156.4	+ 148.1	4 −3	+ 264.1	− 91.3	− 46.1	− 51.2	+ 165.7	+ 109.8
0 −1	+ 2521.5	− 9.2	− 274.4	− 2319.6	+ 946.0	−1066.3	5 −3	+ 87.3	− 26.9	− 21.3	+ 18.1	+ 55.0	+ 49.7
1 −1	− 1310.8	+ 148.2	+ 146.4	+ 239.5	− 712.7	− 136.9	6 −3	+ 17.8	− 4.8	+ 1.9	+ 2.3	+ 19.4	+ 13.1
2 −1	+ 1100.5	− 208.3	− 83.6	+ 1111.2	+ 742.9	+ 793.3	7 −3	+ 6.8	− 8.8	− 4.0	+ 7.0		
3 −1	+ 170.0	− 14.4	− 22.2	+ 189.0	+ 93.1	+ 126.7	8 −3	− 4.9	+ 4.3	− 1.6	− 5.4		
4 −1	+ 60.0	− 18.5	+ 4.5	+ 46.9	+ 30.0	+ 21.6							
5 −1	− 7.9	− 0.8	+ 11.4	+ 5.3			−2 −4	+ 13.6	− 8.6	− 0.4	+ 1.3	+ 18.5	+ 1.5
6 −1	+ 15.4	− 11.4	− 4.1	+ 7.7			−1 −4	− 9.4	+ 16.2	+ 2.6	− 3.2	− 15.4	+ 0.5
7 −1	+ 6.9	+ 8.3	+ 1.6	− 6.8			0 −4	− 48.1	− 24.1	− 10.2	+ 48.4	− 9.5	+ 5.2
8 −1	+ 2.2	− 6.5	+ 5.4	+ 2.1			1 −4	+ 327.4	+ 6.0	− 14.5	− 315.9	+ 68.2	− 58.1
							2 −4	−1374.1	+ 339.5	+ 377.7	+1337.6	− 155.1	+ 274.1
−4 −2	− 13.7	+ 1.2	− 0.4	+ 25.9			3 −4	+2445.8	− 526.9	− 576.6	−2365.7	+ 290.1	− 439.8
−3 −2	+ 11.1	− 2.4	− 7.6	− 24.2			4 −4	+ 567.4	− 81.7	− 116.2	− 665.3	− 48.3	− 162.0
−2 −2	− 4.1	+ 9.2	+ 22.3	+ 12.4			5 −4	+ 204.0	− 65.5	− 43.2	− 113.2	+ 75.9	+ 24.5
−1 −2	+ 129.5	+ 109.7	+ 86.1	− 135.9	+ 63.1	− 15.3	6 −4	+ 39.5	− 14.6	− 13.4	− 21.1	+ 31.9	+ 22.7
0 −2	− 3339.0	+ 294.1	+ 393.6	+ 3296.3	− 428.2	+ 589.8	7 −4	+ 31.2	− 17.1	− 8.3	+ 1.9		
1 −2	+10242.4	−1049.0	−1302.1	−10042.0	−1317.9	−1799.0	8 −4	− 13.2	+ 6.9	− 2.7	− 16.7		
2 −2	+ 337.0	+ 64.6	+ 21.0	− 820.1	− 303.0	− 271.8							

Retained Terms of the Forces.

i, i'	$\mathbf{X}_1$		$\mathbf{Y}_1$		$\mathbf{Z}_1$		i, i'	$\mathbf{X}_1$		$\mathbf{Y}_1$		$\mathbf{Z}_1$	
	cos	sin	cos	sin	cos	sin		cos	sin	cos	sin	cos	sin
−1 −5	− 2.3	+ 4.6	− 5.3	+ 0.9	+ 33.3	+ 2.5	9 −6	− 21.0	+ 3.9	− 3.9	− 20.8		
0 −5	+ 2.5	− 2.0	+ 8.7	− 1.4	− 14.4	− 0.2							
1 −5	− 46.7	− 0.6	− 11.0	+ 44.7	− 8.7	+ 7.8	1 −7	− 6.0	− 13.2	+ 4.5	+ 6.9	+ 32.3	− 1.5
2 −5	+ 261.0	− 44.9	− 43.0	− 252.9	+ 44.5	− 52.1	2 −7	+ 21.2	+ 10.3	− 4.7	− 12.5	− 2.5	− 1.0
3 −5	− 804.6	+ 266.5	+ 276.2	+ 790.9	− 81.9	+ 168.1	3 −7	− 53.6	+ 1.2	+ 12.9	+ 42.8	− 5.0	+ 8.0
4 −5	+1037.1	− 288.1	− 306.7	−1000.8	+ 122.8	− 191.4	4 −7	+ 133.3	− 42.0	− 51.5	− 120.4	+ 13.2	− 27.0
5 −5	+ 385.4	− 77.0	− 96.6	− 407.2	− 18.8	− 95.6	5 −7	− 223.6	+ 106.2	+ 113.6	+ 229.7	− 15.5	+ 50.5
6 −5	+ 119.0	− 37.1	− 38.9	− 98.4	+ 31.6	− 2.1	6 −7	+ 149.6	− 58.5	− 79.5	− 171.2	+ 17.1	− 30.6
7 −5	+ 40.8	− 29.4	− 3.0	− 37.0	+ 18.4	+ 5.6	7 −7	+ 148.6	− 45.4	− 39.2	− 83.3	− 0.5	− 20.7
8 −5	− 16.9	+ 9.9	− 19.2	− 29.0			8 −7	+ 23.1	− 7.7	− 6.3	− 45.1		
9 −5	− 12.4	+ 3.4	− 3.3	− 12.3			9 −7	− 9.7	+ 12.0	− 11.9	− 9.7		
−2 −6	− 11.2	+ 6.2	− 19.4	− 19.9			−1 −8	+ 5.2	− 17.5	− 17.5	− 5.1		
−1 −6	+ 1.7	− 7.3	+ 24.2	+ 11.4	− 30.3	− 2.1	0 −8	+ 2.8	+ 19.0	+ 18.9	− 1.2	+ 24.0	+ 1.6
0 −6	+ 0.3	+ 9.0	− 26.7	+ 0.5	+ 25.7	+ 1.6	1 −8	− 12.6	− 16.4	− 16.2	+ 9.1	− 37.9	+ 1.9
1 −6	+ 0.4	− 6.0	+ 25.9	− 16.4	− 8.3	− 2.4	2 −8	+ 13.1	+ 12.6	+ 12.4	− 12.1	+ 16.8	− 2.3
2 −6	− 37.7	+ 10.0	− 15.1	+ 64.1	− 9.8	+ 11.9	3 −8	− 8.7	− 7.3	− 6.3	+ 9.4	− 1.9	+ 0.8
3 −6	+ 175.4	− 55.6	− 44.8	− 205.8	+ 25.6	− 43.0	4 −8	− 9.8	+ 9.3	+ 9.4	+ 10.2	− 0.7	+ 3.1
4 −6	− 424.6	+ 177.8	+ 181.2	+ 459.3	− 38.5	+ 98.1	5 −8	+ 62.0	− 26.9	− 28.9	− 66.9	+ 5.6	− 13.7
5 −6	+ 411.7	− 136.9	− 159.7	− 422.5	+ 49.2	− 80.5	6 −8	− 93.5	+ 50.5	+ 58.8	+ 104.6	− 3.6	+ 21.0
6 −6	+ 228.2	− 55.2	− 50.9	− 192.7	− 5.7	− 47.5	7 −8	+ 42.2	− 4.2	− 16.6	− 72.7	+ 5.3	− 9.6
7 −6	+ 89.2	− 22.3	− 54.2	− 93.4	+ 10.5	− 8.1	8 −8	+ 24.9	− 38.7	− 19.7	− 10.6		
8 −6	− 22.5	− 8.9	+ 0.8	− 50.3									

For the computation of $r^\circ R^\circ = x_1 \mathbf{X}_1 + y_1 \mathbf{Y}_1$

and $c^\circ T^\circ = \mathbf{X}_1 \frac{dx_1}{dt} + \mathbf{Y}_1 \frac{dy_1}{dt}$

we have the above series for x_1 and y_1 with reversed signs, and

$$\frac{dx_1}{dt} = -4.07365 \sin M - 0.87270 \sin 2M - 0.21058 \sin 3M - 0.05352 \sin 4M - 0.01402 \sin 5M - 0.00375 \sin 6M - 0.00100 \sin 7M$$

$$\frac{dy_1}{dt} = +0.00003 + 4.02388 \cos M + 0.86552 \cos 2M + 0.20922 \cos 3M + 0.05330 \cos 4M + 0.01392 \cos 5M + 0.00380 \cos 6M + 0.00112 \cos 7M + 0.00028 \cos 8M$$

These multiplications furnish us now finally the material for the formation of the differential equation for $r^\circ \delta r$, namely, of

$$\frac{d^2(r^\circ \delta r)}{dt^2} + \frac{\kappa^2(1+m)}{r^{\circ 3}} (r^\circ \delta r) = r^\circ R^\circ + 2 \int c^\circ T^\circ dt = \Sigma.$$

Terms of Σ retained for integration.

i,	i'	cos	sin	i,	i'	cos	sin	i,	i'	cos	sin	i,	i'	cos	sin
0	0	+ 9109.8	0.0	−1	−2	− 214.7	− 225.4	4	−4	+8063.0	−1850.3	6	−6	+1013.5	−350.0
1	0	− 7631.9	+ 561.6	0	−2	+ 3113.6	+ 435.3	5	−4	+3015.7	− 525.3	7	−6	+ 677.6	−202.9
2	0	− 13.2	− 877.8	1	−2	−49502.2	+5429.7	6	−4	+ 950.1	− 251.7	8	−6	+ 362.8	−129.7
3	0	− 31.4	− 142.2	2	−2	+51251.5	−6036.5	7	−4	+ 195.6	− 60.2				
4	0	+ 27.6	− 5.0	3	−2	+ 8109.5	− 413.2					1	−7	+ 28.7	+ 53.2
5	0	− 35.0	− 18.2	4	−2	+ 1518.4	− 473.2	1	−5	+ 77.2	− 40.9	2	−7	+ 157.4	− 70.3
6	0	+ 30.0	− 2.2	5	−2	+ 431.0	− 90.6	2	−5	− 638.2	− 18.8	3	−7	+ 130.5	+ 2.7
7	0	− 29.5	+ 21.7					3	−5	+1875.3	− 439.1	4	−7	− 307.2	+ 62.4
8	0	+ 14.1	− 44.6	0	−3	− 208.1	− 119.9	4	−5	−3827.3	+1280.4	5	−7	+ 609.7	−243.4
9	0	+ 3.0	+ 20.6	1	−3	+ 5649.5	+ 26.7	5	−5	+2916.8	− 851.0	6	−7	− 783.2	+388.8
				2	−3	−15678.7	+3104.7	6	−5	+1588.1	− 379.9	7	−7	+ 289.9	−139.6
−2	−1	+ 10.1	− 80.2	3	−3	+20761.9	−3605.4	7	−5	+ 501.0	− 127.7	8	−7	+ 365.4	−123.3
−1	−1	+ 578.1	+ 686.0	4	−3	+ 5454.1	− 628.4	8	−5	+ 192.7	− 75.1				
0	−1	− 3520.7	− 11.5	5	−3	+ 1309.6	− 321.7					2	−8	+ 101.2	+120.2
1	−1	+16549.2	−1084.2	6	−3	+ 330.1	− 126.3	0	−6	− 29.7	− 74.4	3	−8	+ 105.6	+ 96.9
2	−1	− 2803.0	+ 760.2					1	−6	+ 92.7	+ 123.8	4	−8	− 28.5	− 31.8
3	−1	− 261.1	− 495.8	0	−4	+ 67.5	+ 56.3	2	−6	+ 370.1	+ 256.6	5	−8	− 85.7	+ 51.5
4	−1	− 99.9	− 116.9	1	−4	+ 399.3	+ 32.9	3	−6	− 440.1	+ 30.6	6	−8	+ 272.2	−123.8
5	−1	+ 34.7	− 45.4	2	−4	+ 3281.9	− 388.5	4	−6	+1089.6	− 344.7	7	−8	− 311.7	+153.9
				3	−4	− 7965.4	+2071.6	5	−6	−1794.8	+ 723.2	8	−8	+ 119.9	+ 17.6

For the computation of the coefficients of integration we have, —

$\log \mu$	3.008587	$\log p_0$	9.87395n		
$\log \frac{365.25}{206266}$	7.248165	" p_1	0.35322	$\log q_1$	0.34788
$\log \mu'$	2.475858	" p_2	9.38308	" q_2	9.37951
" μ	+ 0.256752	" p_3	8.58950	" q_3	8.58670
" μ'	+ 9.724023	" p_4	7.86982	" q_4	7.86747
μ	1.806142	" p_5	7.19033	" q_5	7.19033
μ'	0.529691	" p_6	6.54407	" q_6	6.54407

p and q are the coefficients in the series for x_1 and y_1.

$\log \frac{1}{a\,b}$	9.288603	μ	1.806142	μ'	0.529691
$\log \frac{1}{\mu}$	9.743248	$2\,\mu$	3.612284	$2\,\mu'$	1.059382
		$3\,\mu$	5.418426	$3\,\mu'$	1.589073
$\log \frac{1}{a\,b\,\mu}$	9.031851	$4\,\mu$	7.224568	$4\,\mu'$	2.118764
		$5\,\mu$	9.030710	$5\,\mu'$	2.648455
		$6\,\mu$	10.836852	$6\,\mu'$	3.178146
		$7\,\mu$	12.642996	$7\,\mu'$	3.707837
		$8\,\mu$	14.449136	$8\,\mu'$	4.237528
		$9\,\mu$	16.255278	$9\,\mu'$	4.767219
		$10\,\mu$	18.061420		
		$11\,\mu$	19.867562		

Log of the "Entwickelungs-Factoren."

$i+4$ and $i-4$	$^{+3,\ +1}_{-1,\ -3}$ 4.68480n	$^{+4,\ 0}_{0,\ -4}$ 7.33105	$^{+5,\ -1}_{+1,\ -5}$ 7.30661n	....	
$i+3$ and $i-3$	$^{+2,\ +1}_{-1,\ -2}$ 6.02698n	$^{+3,\ 0}_{0,\ -3}$ 7.92534	$^{+4,\ -1}_{+1,\ -4}$ 7.90573n	$^{+5,\ -2}_{+2,\ -5}$	6.40380n
$i+2$ and $i-2$	$^{+2,\ 0}_{0,\ -2}$ 8.54206	$^{+3,\ -1}_{+1,\ -3}$ 8.52827n	$^{+4,\ -2}_{+2,\ -4}$ 7.01565n	$^{+5,\ -3}_{+3,\ -5}$	5.66881n
$i+1$ and $i-1$	$^{+1,\ 0}_{0,\ -1}$ 9.20940	$^{+2,\ -1}_{+1,\ -2}$ 9.19653n	$^{+3,\ -2}_{+2,\ -3}$ 7.65594n	$^{+4,\ -3}_{+3,\ -4}$	6.28942n
i	$^{+1,\ -1}_{}$ 9.98970n	$^{+2,\ -2}_{}$ 8.35223n	$^{+3,\ -3}_{}$ 6.94297n	$^{+4,\ -4}_{}$	5.62793n

The numbers above the logarithms are those which constitute $\pm x$ in $i \pm x$.

Specimen of the Tables of Divisors.

For the Class $i' = 0$.

		−4 $9{\cdot}14119_n$	−3 $9{\cdot}26613_n$	−2 $9{\cdot}44221_n$	−1 $9{\cdot}74325_n$	0 ∞	+1 9·74325	+2 9·44221	+3 9·26613	+4 9·14119	+5 9·04428	+6 8·96510	+7 8·89815	+8 8·84016	+9 8·78900
−5	$9{\cdot}04428_n$	8·18547	8·31041	8·48649	8·78753	$8{\cdot}08856_n$	$8{\cdot}78753_n$	$8{\cdot}48649_n$	$8{\cdot}31041_n$						
−4	$9{\cdot}14119_n$		8·40732	8·58340	8·88444	$8{\cdot}28238_n$	$8{\cdot}88444_n$	$8{\cdot}58340_n$	$8{\cdot}40732_n$	$8{\cdot}28238_n$					
−3	$9{\cdot}26613_n$			8·70834	9·00988	$9{\cdot}53296_n$	$9{\cdot}00988_n$	$8{\cdot}70834_n$	$8{\cdot}53296_n$	$8{\cdot}40732_n$	$8{\cdot}31041_n$				
−2	$9{\cdot}44221_n$				9·18546	$8{\cdot}88442_n$	$9{\cdot}18566_n$	$8{\cdot}88442_n$	$8{\cdot}70834_n$	$8{\cdot}58340_n$	$8{\cdot}48649_n$	$8{\cdot}40731_n$			
−1	$9{\cdot}74325_n$					$9{\cdot}48650_n$	$9{\cdot}48650_n$	$9{\cdot}18546_n$	$9{\cdot}00988_n$	$8{\cdot}88444_n$	$8{\cdot}78753_n$	$8{\cdot}70835_n$	$8{\cdot}64140_n$		
0	∞						$9{\cdot}48650_n$	$8{\cdot}88442_n$	$8{\cdot}53296_n$	$8{\cdot}28238_n$	$8{\cdot}08856_n$	$7{\cdot}93020_n$	$7{\cdot}79630_n$	$7{\cdot}68032_n$	
+1	9·74325							9·18546	9·00988	8·88444	8·78753	8·70835	8·64140	8·58341	8·53225
+2	9·44221								8·70834	8·58340	8·48649	8·40731	8·34036	8·28237	8·23121
+3	9·26613									8·40732	8·31041	8·28123	8·16428	8·10629	8·05513
+4	9·14119										8·18547	8·10629	8·03934	7·98125	7·93019
+5	9·04428											8·00938	7·94243	7·88444	7·83328
+6	8·96510												7·86325	7·80526	7·75410
+7	8·89815													7·73831	7·68715
+8	8·84016														7·62916

When for this class $i' = 0$, one of the divisors in $\frac{1}{(i-\kappa)\mu \cdot (i-\kappa')\mu}$, becomes zero we have to put down the negative square of that divisor which retains a real value. This table of the divisor for $i' = 0$ and for the coefficients of integration $f_i^0(i+\varkappa)$ is changed into the table of the divisors for $f_i^c(i+\varkappa)$ by squaring all the numbers and by adding to the logarithms of the squares $\log(c+c')\mu$. Excepted herefrom are the terms for which c or c' becomes zero. Those terms are to be multiplied by $\frac{1}{c'\mu}$ or $\frac{1}{c\mu}$.

Specimen of the Tables of the Coefficients of Integration.

$i' = 0.$

	$f-4$	$f-3$	$f-2$	$f-1$	$f\,0$	$f+1$	$f+2$	$f+3$	$f+4$	$f+5$	$f+6$	$f+7$	Σ
$i=0$	+0·00008	+0·00031	+0·00082	−0·02532	+0·30112*	−0·02532	+0·00082	+0·00031	+0·00008				+0·25290
$i=1$		−0·00014	−0·00084	−0·00806	−0·02532	+0·07717*	+0·03052	+0·00427	+0·00073	+0·00015			+0·07846
$i=2$			−0·00009	−0·00085	+0·00082	+0·03052	−0·09931*	−0·00371	−0·00073	−0·00015	−0·00004		−0·07355
$i=3$				−0·00014	+0·00031	+0·00427	−0·00371	−0·03879*	−0·00091	−0·00019	−0·00004		−0·03920
$i=4$					+0·00008	+0·00073	−0·00073	−0·00091	−0·02059*	−0·00030	−0·00007		−0·02179
$i=5$						+0·00015	−0·00015	−0·00019	−0·00030	−0·01282*	−0·00012		−0·01343
$i=6$								−0·00004	−0·00007	−0·00012	−0·00877*		−0·00900
$i=7$												−0·00639*	−0·00639

In such a table it is only necessary to compute the values on one side of the diagonal line of asterisks, since the values appear on both sides arranged in the same manner as $[a\,b]$, $[a\,c]$, $[b\,c]$, with respect to $[a\,a]$, $[b\,b]$ in the method of least squares. By means of the horizontal sums Σ the coefficients are checked because of

$$\sum_{x=-\infty \ldots +\infty} f_i^{i'}(i+x, i') = -\frac{(p_0+p_1+p_2\ldots.)}{a\,b}\left\{\frac{q_1}{(i+1, i')\,(i-1, i')}+\frac{2\,q_2}{(i+2, i')\,(i-2, i')}+\frac{3\,q_3}{(i+3, i')\,(i-3, i')}\right.$$

$r^\circ\,\delta\,r$

i,	i'	cos	sin	i,	i'	cos	sin	i,	i'	cos	sin	i,	i'	cos	sin
0	0	+ 41.67t	0.0	0	−2	+ 9933.9	− 754.7	5	−4	− 61.9	+11.5	−1	−7	+ 1.3	− 3.6
1	0	−125.63t	−3697.52t	1	−2	−12287.5	+1166.2	6	−4	− 15.0	+ 3.9	0	−7	+ 7.9	− 21.8
2	0	− 13.46t	− 397.69t	2	−2	−21290.5	+2442.7	7	−4	− 1.8	+ 0.5	1	−7	+ 64.1	−210.9
3	0	− 2.61t	− 64.08t	3	−2	− 2306.4	+ 229.2					2	−7	− 31.3	+ 22.5
4	0	0.0	− 12.23t	4	−2	− 371.6	+ 50.1	−1	−5	+ 2.2	− 0.7	3	−7	+148.5	+ 87.3
5	0	0.0	− 2.51t	5	−2	− 46.1	+ 6.0	0	−5	+ 14.2	− 4.0	4	−7	+ 51.3	+ 3.4
								1	−5	+127.2	− 9.3	5	−7	− 19.2	+ 10.6
0	0	+ 2936.7	0.0	−3	−3	− 1.0	− 0.6	2	−5	−138.4	−29.3	6	−7	+ 17.3	− 8.0
1	0	− 989.2	+ 19.8	−2	−3	− 44.5	− 3.4	3	−5	−433.7	+80.6	7	−7	− 3.7	− 1.9
2	0	− 210.4	+ 105.3	−1	−3	− 276.0	− 23.1	4	−5	+184.0	−67.4	8	−7	− 3.3	+ 1.1
3	0	− 25.8	+ 11.2	0	−3	− 2694.8	− 192.4	5	−5	− 77.9	+21.7				
4	0	− 6.2	+ 1.2	1	−3	− 3380.5	+1118.1	6	−5	− 25.7	+ 5.8	0	−8	+ 1.7	+ 2.1
				2	−3	+18286.1	−3229.5	7	−5	− 5.8	+ 1.5	1	−8	+ 13.0	+ 15.7
−3	−1	− 15.5	− 3.7	3	−3	− 155.7	+ 30.7	8	−5	− 1.4	0.0	2	−8	+ 14.3	+ 22.4
−2	−1	− 111.9	− 15.2	4	−3	+ 17.1	− 13.5					3	−8	+ 32.1	+ 24.5
−1	−1	− 969.8	− 293.3	5	−3	+ 3.3	− 0.4	−1	−6	+ 0.2	+ 1.2	4	−8	+ 13.9	+ 12.8
0	−1	− 4613.1	+ 328.3	6	−3	− 9.6	+ 2.4	0	−6	+ 6.3	+17.9	5	−8	+ 5.6	− 1.1
1	−1	+10401.0	− 584.0					1	−6	− 27.4	+15.8	6	−8	− 6.3	+ 3.1
2	−1	+ 2177.7	− 221.7	−2	−4	+ 1.5	− 0.4	2	−6	+ 28.2	+51.6	7	−8	+ 4.5	− 2.3
3	−1	+ 291.9	+ 3.1	−1	−4	+ 4.6	− 2.3	3	−6	+279.0	+42.3	8	−8	− 1.2	0.0
4	−1	+ 52.3	− 0.4	0	−4	+ 32.0	− 33.7	4	−6	− 55.1	+30.5				
				1	−4	− 716.1	+ 96.8	5	−6	+ 59.2	−21.5	6	−9	+ 1.5	− 0.9
−3	−2	+ 8.3	+ 1.5	2	−4	+ 2107.7	− 145.9	6	−6	− 17.3	+ 6.0	7	−9	− 2.2	+ 1.0
−2	−2	+ 142.5	− 2.2	3	−4	+ 1322.8	− 288.0	7	−6	− 7.9	+ 2.4	8	−9	+ 0.4	− 0.8
−1	−2	+ 980.0	+ 17.4	4	−4	− 264.9	+ 66.3	8	−6	− 2.8	+ 1.0	9	−9	− 0.1	0.0

For the formation of the differential equations for ξ_1 and η_1 it is necessary to multiply $r^\circ\,\delta\,r$ with $\frac{3\,\kappa^2}{r^{05}}\,x_1$ and $\frac{3\,\kappa^2}{r^{05}}\,y_1$.

$$\frac{3\kappa^2}{r^{\cos}} x_1 = +1.04488 + 5.01118\cos M + 3.00130\cos 2M + 1.38657\cos 3M + 0.56905\cos 4M + 0.21828\cos 5M + 0.08089\cos 6M + 0.03161\cos 7M + 0.00979\cos 8M$$

$$\frac{3\kappa^2}{r^{\cos}} y_1 = +4.39501\sin M + 2.81725\sin 2M + 1.33137\sin 3M + 0.55228\sin 4M + 0.21259\sin 5M + 0.07719\sin 6M + 0.02454\sin 7M$$

Having performed these multiplications we obtain for integration

$$\frac{d^2\xi_1}{dt^2} + \frac{\kappa^2(1+m)}{r^{\cos}}\xi_1 = X_1 + \frac{3\kappa^2(1+m)x_1}{r^{\cos}} \quad (r^\circ\,\delta r) = {}^{\xi_1}\Sigma,$$

$$\frac{d^2\eta^1}{dt^2} + \frac{\kappa^2(1+m)}{r^{\cos}}\eta_1 = Y_1 + \frac{3\kappa^2(1+m)y_1}{r^{\cos}} \quad (r^\circ\,\delta r) = {}^{\eta_1}\Sigma,$$

and simply

$$\frac{d^2\zeta_1}{dt^2} + \frac{\kappa^2(1+m)}{r^{\cos}}\zeta_1 = Z_1.$$

i	i'	${}^{\xi_1}\Sigma$ cos	${}^{\xi_1}\Sigma$ sin	${}^{\eta_1}\Sigma$ cos	${}^{\eta_1}\Sigma$ sin	i	i'	${}^{\xi_1}\Sigma$ cos	${}^{\xi_1}\Sigma$ sin	${}^{\eta_1}\Sigma$ cos	${}^{\eta_1}\Sigma$ sin
0	0	− 293.0t	0.0	− 8731.9t	0.0	4	−1	+ 9901.6	− 687.9	+ 639.9	+ 9298.1
1	0	− 157.8t	+ 878.7t	− 6465.1t	+ 28.9t	5	−1	+ 4485.2	− 293.2	+ 293.5	+ 4324.0
2	0	− 300.4t	− 7176.5t	+ 5387.1t	− 241.4t	6	−1	+ 1848.4	− 128.2	+ 108.6	+ 1792.8
3	0	− 204.0t	− 5548.1t	+ 4985.9t	− 187.2t	7	−1	+ 707.7	− 35.2	+ 42.0	+ 685.0
4	0	− 103.3t	− 2019.2t	+ 2747.8t	− 98.1t						
5	0	− 44.5t	− 1300.9t	+ 1255.3t	− 42.8t	−5	−2	+ 642.1	+ 12.6	+ 10.6	− 722.2
6	0	− 17.7t	− 525.2t	+ 523.1t	− 16.7t	−4	−2	+ 1486.2	+ 29.1	+ 24.1	− 1432.4
7	0	− 6.5t	− 205.2t	+ 214.3t	− 5.8t	−3	−2	+ 2815.4	+ 106.1	+ 100.8	− 2580.8
8	0	− 2.5t	− 86.7t	+ 72.6t	− 2.2t	−2	−2	+ 2684.3	+ 452.4	+ 471.5	− 1797.5
9	0	− 1.0t	− 29.0t	+ 9.4t	− 0.3t	−1	−2	− 7484.1	+ 1745.8	+ 1767.9	+10518.1
10	0	− 0.1t	− 3.9t	+ 1.6t	− 0.0	0	−2	−54730.2	+ 6308.1	+ 6527.9	+64290.9
		Check.		Check.		1	−2	−33213.1	+ 4804.2	+ 6058.7	+63561.3
$\frac{1}{2}a_0' p_0 + \frac{1}{2}\Sigma a_m' p_m = +0.7$				$\Sigma b_m' q_m = +0.2$	$= -1.3$	2	−2	−43437.6	+ 5071.7	− 911.5	− 7514.1
						3	−2	−67573.3	+ 7582.9	− 6459.1	−56034.2
0	0	− 1018.5	0.0	+ 266.3	0.0	4	−2	−43662.0	+ 4902.5	− 4521.2	−40231.6
1	0	+15182.5	− 28.1	+ 162.6	+15375.4	5	−2	−21547.8	+ 2409.7	− 2290.0	−20489.0
2	0	+ 5564.4	+ 173.9	− 34.7	+ 5736.0	6	−2	− 9236.7	+ 1028.4	− 1022.1	− 8963.1
3	0	+ 1767.9	+ 254.2	− 196.5	+ 1794.1	7	−2	− 3643.3	+ 418.6	− 375.7	− 3553.1
4	0	+ 493.1	+ 187.1	− 172.2	+ 546.1	8	−2	− 1396.3	+ 152.9	− 165.9	− 1351.0
5	0	+ 117.3	+ 92.0	− 105.0	+ 88.9						
6	0	+ 27.6	+ 40.7	− 12.6	+ 52.6	−4	−3	− 651.5	− 85.0	− 81.9	+ 655.5
7	0	+ 12.2	+ 15.1	− 50.0	− 14.3	−3	−3	− 1374.1	− 208.3	− 196.8	+ 1267.2
						−2	−3	− 1941.2	− 493.8	− 469.4	+ 1623.6
−5	−1	− 406.2	− 85.9	− 90.4	+ 427.5	−1	−3	+ 389.6	− 1075.9	− 986.1	− 1536.3
−4	−1	− 982.6	− 212.8	− 197.2	+ 914.4	0	−3	+15466.8	− 2231.2	− 1968.7	−19070.7
−3	−1	− 1719.4	− 439.9	− 409.9	+ 1568.1	1	−3	+32924.0	− 7039.1	− 6188.3	−44406.5
−2	−1	− 1636.9	− 655.5	− 551.2	+ 1006.6	2	−3	+11266.3	− 1666.8	− 3073.1	−16238.7
−1	−1	+ 4032.3	− 612.7	− 215.2	− 6026.3	3	−3	+39386.4	− 6595.6	+ 5534.2	+32608.6
0	−1	+24638.8	− 2220.4	− 1199.6	−30750.9	4	−3	+24184.2	− 4154.3	+ 3749.3	+22344.9
1	−1	+ 2392.2	− 642.0	− 633.8	−16574.1	5	−3	+11285.6	− 1951.6	+ 1832.9	+10799.1
2	−1	+22618.3	− 1611.4	+ 943.3	+16076.1	6	−3	+ 4654.2	− 807.3	+ 782.0	+ 4512.8
3	−1	+18183.6	− 1301.6	+ 1150.8	+16159.8	7	−3	+ 1770.4	− 314.5	+ 294.3	+ 1739.2

i, i'	$\xi_1 \Sigma$		$\eta_1 \Sigma$		i, i'	$\xi_1 \Sigma$		$\eta_1 \Sigma$	
	cos	sin	cos	sin		cos	sin	cos	sin
8 −3	+ 643.7	− 106.8	+ 106.7	+ 636.1	2 −6	+ 584.2	+ 270.1	+ 47.8	− 556.3
					3 −6	+ 437.0	+ 203.4	− 151.2	− 126.5
−2 −4	+ 310.6	− 68.2	− 56.7	− 288.9	4 −6	+ 358.0	+ 366.4	− 36.9	+ 995.9
−1 −4	+ 810.7	− 101.6	− 103.4	− 799.2	5 −6	+ 709.5	+ 42.1	− 309.6	− 87.7
0 −4	+ 2202.0	− 221.4	− 169.3	− 2134.8	6 −6	+ 450.4	− 3.1	− 84.7	+ 71.9
1 −4	+ 6730.5	− 729.0	− 615.5	− 6538.2	7 −6	+ 162.7	+ 5.0	− 73.3	+ 0.4
2 −4	+ 1955.1	− 235.7	− 317.0	− 2674.6					
3 −4	+ 7290.6	− 885.8	− 204.7	+ 1960.0	−2 −7	+ 54.5	− 161.6	− 161.9	− 67.0
4 −4	+ 6102.3	− 860.7	+ 698.4	+ 4901.3	−1 −7	+ 151.6	− 346.6	− 304.2	− 128.3
5 −4	+ 2681.5	− 386.5	+ 300.1	+ 2412.3	0 −7	+ 239.2	− 450.1	− 367.1	− 210.4
6 −4	+ 906.7	− 113.1	+ 92.0	+ 861.4	1 −7	+ 259.1	− 101.8	+ 234.0	− 144.9
7 −4	+ 293.8	− 37.9	+ 14.6	+ 267.7	2 −7	+ 602.1	− 301.2	+ 692.7	− 249.8
					3 −7	+ 235.5	− 165.7	+ 292.0	− 25.8
−1 −5	+ 23.6	− 23.9	− 30.9	− 13.7	4 −7	+ 533.2	+ 74.6	− 117.3	+ 228.1
0 −5	− 124.0	− 35.9	− 13.9	+ 166.0	5 −7	+ 140.3	+ 187.4	+ 9.8	+ 518.6
1 −5	− 770.1	− 13.7	+ 9.7	+ 895.9	6 −7	+ 283.7	+ 4.4	− 151.0	− 31.0
2 −5	− 414.6	+ 12.5	+ 81.9	+ 801.6	7 −7	+ 228.1	− 28.0	− 54.4	+ 9.6
3 −5	− 1078.9	+ 128.4	+ 243.3	+ 400.4					
4 −5	− 210.8	− 143.9	− 378.3	− 1848.4	−1 −8	+ 49.6	+ 35.3	+ 32.3	− 47.1
5 −5	− 18.1	− 108.7	− 24.7	− 603.6	0 −8	+ 85.2	+ 114.7	+ 104.7	− 75.5
6 −5	− 169.1	− 27.5	− 32.8	− 308.5	1 −8	+ 99.9	+ 107.1	+ 71.3	− 74.1
7 −5	− 155.7	− 8.3	− 20.1	− 207.0	2 −8	+ 166.9	+ 158.9	+ 46.6	− 73.9
8 −5	− 124.0	+ 25.8	− 33.9	− 128.7	3 −8	+ 121.3	+ 131.4	− 50.9	+ 24.9
					4 −8	+ 123.3	+ 129.5	− 86.5	+ 104.0
−1 −6	+ 71.7	+ 112.7	+ 134.3	− 55.7	5 −8	+ 154.8	+ 65.2	− 107.3	+ 30.4
0 −6	+ 164.4	+ 183.6	+ 112.6	− 154.6	6 −8	− 27.9	+ 89.5	+ 13.8	+ 155.1
1 −6	+ 453.6	+ 265.6	+ 173.0	− 434.8	7 −8	+ 57.3	+ 18.4	− 40.2	− 55.8

The integration of the preceding three differential equations gives finally the perturbations of the rectangular co-ordinates.

i, i'	ξ_1		η_1		ζ_1	
	cos	sin	cos	sin	cos	sin
0 0	− 84.94t	0.0	−1022.41t	0.0	+ 148.67t	0.0
1 0	− 4.74t	+4279.97t	−4154.40t	− 11.92t	− 448.23t	+ 493.85t
2 0	+ 25.65t	+1241.89t	−1226.46t	+ 24.98t	− 48.01t	+ 53.12t
3 0	+ 8.30t	+ 325.86t	− 322.92t	+ 8.27t	− 7.72t	+ 8.56t
4 0	+ 2.50t	+ 86.21t	− 85.92t	+ 2.37t	− 1.47t	+ 1.63t
5 0	+ 0.68t	+ 22.98t	− 22.70t	0.0	− 0.31t	+ 0.34t
6 0	+ 0.16t	+ 6.19t	− 6.02t	0.0	− 0.07t	+ 0.08t
7 0	0.0	+ 1.31t	− 1.37t	0.0	0.0	0.0
0 0	− 699.7	0.0	+ 75.5	0.0		
1 0	+1118.5	− 5.6	− 9.4	+ 901.6	− 202.6	0.0
2 0	+ 463.6	− 31.7	+ 28.9	+ 433.4	+ 129.9	+ 143.4
3 0	+ 100.7	− 15.4	+ 13.1	+ 97.4	+ 38.2	+ 42.2
4 0	+ 23.3	− 5.2	+ 4.9	+ 21.1	+ 5.2	+ 6.6
5 0	+ 5.8	− 1.5	+ 1.7	+ 6.1	+ 0.8	+ 1.0
6 0	+ 0.8	− 0.4	+ 0.1	+ 0.5	+ 0.2	+ 0.2
−5 −1	+ 4.1	+ 1.1	+ 1.0	− 4.0	0.0	
−4 −1	+ 32.1	+ 3.7	+ 3.5	− 32.4	+ 0.8	− 0.9

i	i'	ξ_1 cos	ξ_1 sin	η_1 cos	η_1 sin	ζ_1 cos	ζ_1 sin
−3	−1	+ 122.3	+ 11.8	+ 11.8	− 122.9	+ 4.2	− 4.5
−2	−1	+ 494.5	+ 26.8	+ 26.3	− 491.7	+ 22.7	− 26.9
−1	−1	+ 2208.5	− 55.3	− 72.4	− 2188.4	+ 226.2	− 236.6
0	−1	+ 7732.7	− 671.7	− 325.3	− 7809.7	+ 428.1	− 312.4
1	−1	− 1340.7	− 82.3	− 0.9	− 1289.8	− 554.6	+ 231.4
2	−1	− 3739.2	+ 227.2	− 192.7	− 3658.9	− 202.1	− 114.3
3	−1	− 1092.5	+ 72.3	− 70.3	− 1081.8	− 22.9	− 10.7
4	−1	− 300.6	+ 19.9	− 19.6	− 300.2	− 4.2	− 1.6
5	−1	− 79.0	+ 5.0	− 5.4	− 84.8	− 0.6	− 0.3
6	−1	− 21.9	+ 1.3	− 1.1	− 20.7		
7	−1	− 6.3	0.0	0.0	− 6.1		
−5	−2	− 6.6	− 0.2	− 0.2	+ 7.2		
−4	−2	− 50.0	+ 1.9	+ 2.0	+ 52.5		
−3	−2	− 192.0	+ 7.5	+ 7.8	+ 192.5	− 1.7	+ 2.1
−2	−2	− 776.1	+ 36.1	+ 36.1	+ 779.4	− 9.2	+ 12.0
−1	−2	− 3513.0	+ 213.1	+ 218.7	+ 3500.3	− 72.0	+ 85.4
0	−2	−19149.5	+ 2127.3	+ 2083.7	+19003.2	− 428.6	+ 600.3
1	−2	− 8330.7	+ 1305.0	+ 754.2	+ 9254.2	+ 525.7	− 787.6
2	−2	+10930.4	− 1159.0	+ 1065.5	+10367.5	+ 244.1	− 146.5
3	−2	+ 4932.9	− 540.5	+ 540.7	+ 4849.2	+ 3.7	− 46.1
4	−2	+ 1507.9	− 166.7	+ 166.1	+ 1497.3	+ 1.5	− 7.4
5	−2	+ 428.2	− 47.6	+ 47.9	+ 432.3	+ 0.3	− 1.4
6	−2	+ 122.5	− 13.7	+ 12.7	+ 112.6		
7	−2	+ 30.7	− 3.5	+ 3.0	+ 29.9		
8	−2	+ 8.0	− 0.8	+ 0.9	+ 7.7		
−4	−3	− 1.9	+ 3.0	+ 2.8	+ 4.8		
−3	−3	+ 65.9	+ 3.6	+ 3.5	− 66.1	+ 0.6	− 0.7
−2	−3	+ 245.3	+ 13.5	+ 13.2	− 263.7	+ 3.3	− 3.6
−1	−3	+ 1128.7	+ 45.6	+ 42.7	− 1120.9	+ 21.1	− 22.1
0	−3	+ 5724.9	+ 4.2	− 15.3	− 5630.2	+ 187.9	− 208.4
1	−3	+ 9598.9	− 2097.8	− 1894.6	− 9736.8	+ 145.1	− 246.1
2	−3	− 5031.4	− 17.9	+ 509.0	− 2272.5	− 842.5	+ 1273.3
3	−3	− 3779.0	+ 539.8	− 523.1	− 3638.3	− 69.4	+ 141.1
4	−3	− 1034.5	+ 161.6	− 156.4	− 1022.7	− 18.6	+ 16.8
5	−3	− 268.1	+ 43.2	− 42.6	− 269.3	− 3.7	+ 3.0
6	−3	− 80.4	+ 13.6	− 9.6	− 56.7	− 0.7	+ 0.5
7	−3	− 17.7	+ 3.1	− 3.0	− 17.2		
8	−3	− 4.0	+ 0.7	− 0.6	− 3.9		
−4	−4	− 1.1			+ 1.1		
−3	−4	+ 1.4			− 1.3		
−2	−4	− 3.2	+ 1.4	+ 0.9	+ 2.7		− 0.3
−1	−4	− 8.9	+ 1.2	+ 1.2	+ 9.3	+ 4.3	− 2.5
0	−4	+ 1.4	− 12.1	− 22.6	− 4.0	+ 27.9	− 21.9
1	−4	+ 1826.7	− 182.2	− 135.1	− 1854.9	+ 59.7	− 91.2
2	−4	+ 748.2	− 120.8	− 111.6	− 32.3	− 131.7	+ 217.7
3	−4	− 833.4	+ 99.3	− 1.6	− 402.4	− 56.4	+ 90.2
4	−4	− 294.8	+ 40.7	− 33.9	− 250.5	− 2.5	+ 14.8
5	−4	− 72.0	+ 10.1	− 8.1	− 66.4	− 2.4	+ 0.9
6	−4	− 14.5	+ 1.8	− 1.8	− 16.4	− 0.5	
7	−4	− 3.4	+ 0.3		− 2.9		
−2	−5	− 1.6			+ 1.7		

i, i'	ξ_1		η_1		ζ_1	
	cos	sin	cos	sin	cos	sin
−1 −5	− 10.1	+ 1.9	+ 2.1	+ 10.4	− 2.1	+ 0.2
0 −5	− 47.7	+ 7.9	+ 4.1	+ 46.9	+ 1.8	+ 1.3
1 −5	− 222.1	− 13.4	− 15.2	+ 218.3	− 11.5	+ 10.6
2 −5	− 148.9	+ 21.4	+ 52.2	+ 188.6	+ 13.8	− 9.1
3 −5	+ 204.2	− 30.9	− 40.0	+ 7.4	+ 20.9	− 39.4
4 −5	+ 20.8	+ 7.2	+ 20.2	+ 113.3	− 5.5	+ 8.6
5 −5	+ 2.5	+ 2.9	+ 1.1	+ 20.6	+ 0.6	+ 2.5
6 −5	+ 3.1	− 0.5	+ 0.5	+ 6.1	− 0.5	
7 −5	+ 1.7			+ 2.4		
8 −5	+ 0.9			+ 0.9		
−2 −6	+ 0.7	+ 0.3	+ 0.2	− 0.7		
−1 −6	+ 1.3	− 2.8	− 4.2	− 1.9	+ 1.2	
0 −6	+ 14.0	− 2.3	+ 2.1	− 14.4	− 4.0	− 0.3
1 −6	+ 191.1	+ 141.0	+ 126.8	− 187.8	− 1.4	− 2.7
2 −6	+ 166.8	+ 64.2	− 62.6	− 66.6	+ 2.7	− 2.5
3 −6	− 153.2	− 78.5	+ 95.3	− 77.5	− 14.6	+ 22.4
4 −6	− 37.1	− 32.5	+ 11.8	− 87.9	+ 1.6	− 5.5
5 −6	− 25.6	− 3.1	+ 11.6	− 1.8	− 1.7	+ 2.6
6 −6	− 9.0	− 0.3	+ 1.9	− 2.2		+ 0.9
7 −6	− 2.2		+ 0.9			
−3 −7	− 0.6	+ 0.5	− 0.2	+ 0.4		
−2 −7	− 2.0	+ 4.3	+ 4.3	+ 2.1		
−1 −7	− 9.4	+ 16.8	+ 15.9	+ 9.2	− 1.9	
0 −7	− 41.5	+ 57.1	+ 54.6	+ 41.9	− 5.3	− 0.5
1 −7	− 237.0	+ 146.4	+ 103.9	+ 234.6	− 83.3	− 5.1
2 −7	+ 162.0	− 86.7	+ 110.3	− 238.0	+ 29.9	− 4.7
3 −7	+ 290.3	− 153.9	+ 137.5	+ 272.2	− 8.9	+ 17.8
4 −7	− 20.6	− 30.8	+ 37.4	0.0	− 2.5	+ 4.9
5 −7	− 2.3	− 11.4	+ 4.1	− 17.7	+ 0.3	− 1.6
6 −7	− 5.4	− 1.0	+ 4.1	+ 0.5	− 0.4	+ 0.7
7 −7	− 2.4	− 0.3	+ 1.3	− 0.3		
−1 −8	− 1.6	− 1.4	− 1.4	+ 1.7		
0 −8	− 5.8	− 8.3	− 8.4	+ 6.1	− 0.5	
1 −8	− 16.8	− 21.4	− 22.0	+ 18.8	+ 15.5	− 1.0
2 −8	+ 46.1	+ 43.3	+ 39.6	− 43.5	+ 1.4	− 0.7
3 −8	+ 44.0	+ 50.4	− 46.7	+ 39.6	− 4.0	+ 0.9
4 −8	− 12.4	− 11.7	+ 9.6	− 14.1	− 0.4	− 0.4
5 −8	− 7.7	− 3.0	+ 5.4	− 2.0	− 0.3	+ 0.7
6 −8	+ 0.6	− 2.2	− 0.1	− 4.0		− 0.5
7 −8	− 0.9	+ 0.3	+ 0.6	+ 0.8		

Normal Places referred to the Mean Equinox 1854.0.

Berlin M. T.	α	δ	Berlin M. T.	α	δ
1852, July 1.0	271° 35′ 16.53″	− 8° 35′ 16.00″	1855, April 26.0	223° 23′ 31.65″	− 0° 58′ 16.38″
1852, October 1.0	274 56 46.92	−18 24 28.78	1856, October 22.0	39 13 48.02	− 5 12 59.07
1853, January 1.0	322 28 46.75	−16 2 17.53	1858, March 20.0	182 4 41.86	+ 7 34 3.35
1854, January 28.0	128 3 16.18	+12 2 48.34	1859, July 8.0	278 7 52.10	− 9 19 9.96

The perturbations computed with the above coefficients for the times of the normals are: —

ξ_1	η_1	ζ_1	ξ	η	ζ
+11421	−15176	−2756	+14787	−10133	− 6858
+ 4084	−19862	−2823	+ 9001	−16524	− 8192
+ 1750	−33592	−2105	+10510	−30074	−11002
+39074	− 4084	+3665	+38902	+ 6322	+ 1899
+ 2042	− 2185	+ 532	+ 2592	− 1580	− 98
+ 1754	−14556	− 380	+ 5556	−12885	− 4268
+ 5642	− 2660	+2672	+ 6360	− 1575	+ 1788
+ 8584	−10494	−4500	+10653	− 6160	− 7252

For ξ_1, η_1, ζ_1, the plane of the orbit of Melpomene is the fundamental plane, but ξ, η, ζ are referred to the equator. The transformation is effected by means of the formulas on pages 391 and 392.

We derive from $\pi' = 16° 16' 53''.3$, $\Omega' = 19° 16' 43''.7$, and $i' = 15° 28' 17''.2$ for 1854.0: —

$$\begin{array}{lll} \cos(x_1 x) = +0.959273 & \cos(x_1 y) = +0.282146 & \cos(x_1 z) = -0.013949 \\ \cos(y_1 x) = -0.268411 & \cos(y_1 y) = +0.925742 & \cos(y_1 z) = +0.266394 \\ \cos(z_1 x) = +0.088074 & \cos(z_1 y) = -0.251799 & \cos(z_1 z) = +0.963765 \end{array}$$

The computation of the normal places from the osculating elements for 1854.0 with the perturbations ξ, η, ζ, gives the following equations of condition for the determination of the corrections of the elements: —

+1.72507	−3.46371	+1.76341	−0.01327	+0.11791	− 9.60585	+ 157.29
+1.05428	−2.12179	+0.96271	−0.00356	+0.03244	− 5.53250	+ 26.24
+0.98888	−1.13494	+0.69111	−0.02955	+0.01693	− 3.91254	− 184.68
+1.54040	+3.09070	+1.69341	−0.05026	−0.05610	+ 0.38965	− 508.67
+1.05335	−1.21848	+1.51267	−0.04736	+0.35622	+ 5.19856	+ 75.05
+3.21295	+1.63979	+2.06075	−0.07675	+0.47456	+33.30130	−1902.90
+1.01318	+0.73413	+1.50797	−0.08393	+0.19514	+15.62610	− 219.44
+1.85143	−3.64800	+1.80356	−0.01777	+0.07135	+37.14650	− 606.95
δM	$\delta \varphi$	$\delta \pi$	$\delta \Omega$	δi	$100\,\delta \mu$	$= 0$
−0.08528	+0.22198	−0.13034	+0.17877	+1.44227	+ 0.73639	− 87.12
−0.12241	+0.18470	−0.09555	+0.17529	+0.48963	+ 0.52905	− 26.89
+0.12166	−0.18671	+0.08963	+0.12534	−0.11444	− 0.53821	− 35.08
−0.11837	−0.24087	−0.14720	−0.27302	−0.64995	− 0.13495	+ 82.14
−0.25846	+0.20020	−0.38766	−0.08737	+1.41267	− 1.07558	− 23.25
+0.92431	−0.01619	+0.57207	+0.16001	−1.80113	+ 9.04078	− 511.75
−0.27122	−0.25501	−0.39779	−0.21930	+0.73969	− 4.07944	+ 93.35
−0.04169	+0.15224	−0.08194	+0.20950	+1.35572	− 0.58380	− 67.39

From which, by the method of least squares, is obtained: —

$$\begin{array}{llll} \delta M = +12' 16''.46 & \delta \varphi = +1' 33''.89 & \delta \pi = -9' 0''.57 & \delta \Omega = +2' 41''.49 \\ & \delta i = +0' 12''.08 & \delta \mu = +0''.15125 & \end{array}$$

and thus finally the pure elliptical elements: —

1854, Jan. 0, Washington Mean Time.

$$\begin{array}{lll} M = 80° 8' 53''.31 & & \\ \pi = 15 5 30.95 \\ \Omega = 150 3 49.70 \end{array} \Big\} \text{M. Eq. Ep.} \quad \begin{array}{l} \pi' = 16° 7' 48''.6 \\ \Omega' = 19\ 16\ 5.9 \\ i' = 15\ 27\ 48.0 \end{array}$$

$$\begin{array}{ll} i = 10\ 9\ 16.85 & \\ \varphi = 12\ 34\ 20.18 & \\ \mu = 1020''.11977 & \\ \log a = 0.3609032 & \end{array}$$

With these elements, and the above perturbations, I have constructed tables which represent the normals as follows: —

$\Delta\alpha \cos\delta$	$\Delta\delta$	$\Delta\alpha \cos\delta$	$\Delta\delta$
$+1''.8$	$-1''.5$	$-5''.2$	$+1''.2$
-3.6	-4.3	$+3.8$	-0.3
-2.0	-1.3	$+5.5$	-4.9
-1.3	-2.3	-0.6	$+1.4$

This result is certainly satisfactory, since the perturbations by Saturn have been neglected.

For curiosity's sake I have computed an approximation of the secular variations of the elements from the terms multiplied by t. They are: —

$$\left.\begin{aligned} \Delta\pi &= +32''.01 \\ \Delta\Omega &= -35.01 \\ \Delta i &= -0.33 \\ \Delta\varphi &= +0.68 \end{aligned}\right\} \text{in one year.}$$

II. ON THE CONSTRUCTION OF THE TABLES OF MELPOMENE.

BEFORE entering into the details of the construction of the tables, I would take the liberty of making some general remarks on the treatment of asteroids at the present time.

After two oppositions it is possible to determine the elements of an asteroid near enough the truth for computing the perturbations, and I think those by Jupiter are sufficient for our present purposes. Three oppositions, then, admit the more accurate determination of the elements, and after about eight oppositions they can be finally corrected for the computation of the general perturbations of the first order by Jupiter. Preliminary tables constructed upon them will give, for the next fifty years, the ephemeris near enough to find the planet, and for forming normal places. After that, a computer can do something definite; then he may compute the perturbations of the second order by using those known of the first order, or he may find it necessary to recompute the first order with the elements upon which the preliminary tables are based. And only then it will be necessary to calculate the perturbations by Saturn also. Our duty in our time with respect to the asteroids is, to avoid all superfluous work on them, and to get out as soon as possible such preliminary tables. Those asteroids which are of special interest, as, for instance, Leucothea and Euphrosyne for the determination of the mass of Jupiter, must of course be treated in a different manner. For those it will be best to carry on the special perturbations by Saturn, Jupiter, Mars, Earth, and Venus for a number of years.

A number of small terms and equations have been omitted, since six decimal places were found to be sufficient in the tables. If we denote the Arguments in the following manner,

$I = -M'$	$XVI = -M - 3M'$	$XXXI = 5M - 4M'$
$II = M - M'$	$XVII = 4M - 3M'$	$XXXII = 3M - 8M'$
$III = M - 3M'$	$XVIII = 5M - 2M'$	$XXXIII = -4M + M'$
$IV = M - 2M'$	$XIX = 3M - 7M'$	$XXXIV = 7M - 2M'$
$V = 2M - 3M'$	$XX = 5M - 3M'$	$XXXV = 5M - 6M'$
$VI = 3M - 2M'$	$XXI = -2M - 3M'$	$XXXVI = 6M - M'$
$VII = 2M - M'$	$XXII = M - 7M'$	$XXXVII = 4M - 5M'$
$VIII = -M - 2M'$	$XXIII = M - 5M'$	$XXXVIII = 4M - 7M'$
$IX = -M - M'$	$XXIV = 3M - 5M'$	$XXXIX = M - 8M'$
$X = M - 4M'$	$XXV = -3M - 2M'$	$XL = 7M - 3M'$
$XI = M$	$XXVI = M - 6M'$	$XLI = -M - 5M'$
$XII = 3M - M'$	$XXVII = 2M - 7M'$	$XLII = -M - 7M'$
$XIII = 3M - 4M'$	$XXVIII = 2M - 5M'$	$XLIII = -M + 4M'$
$XIV = -2M - M'$	$XXIX = -3M - M'$	$XLIV = 5M - 8M'$
$XV = 4M - M'$	$XXX = 5M - M'$	$XLV = 5M - 7M'$

the perturbations are: —

	ξ_1		η_1		ζ_1	
	cos	sin	cos	sin	cos	sin
0 *M*	− 84.94*t*		−1022.41*t*		+ 148.67*t*	
M	− 4.74*t*	+4279.97*t*	−4154.40*t*	− 11.92*t*	− 448.23*t*	+ 493.85*t*
2 *M*	+ 25.65*t*	+1241.89*t*	−1226.46*t*	+ 24.98*t*	− 48.01*t*	+ 53.12*t*
3 *M*	+ 8.30*t*	+ 325.86*t*	− 322.92*t*	+ 8.27*t*	− 7.72*t*	+ 8.56*t*
4 *M*	+ 2.50*t*	+ 86.21*t*	− 85.92*t*	+ 2.37*t*	− 1.47*t*	+ 1.63*t*
5 *M*	+ 0.68*t*	+ 22.98*t*	− 22.70*t*		− 0.31*t*	+ 0.34*t*
6 *M*	+ 0.16*t*	+ 6.19*t*	− 6.02*t*		− 0.07*t*	+ 0.08*t*
7 *M*		+ 1.31*t*	− 1.37*t*			
I	+ 7732.7	− 671.7	− 325.3	− 7809.7	+ 428.1	− 312.4
2 I	−19149.5	+ 2127.3	+ 2083.7	+19003.2	− 428.6	+ 600.3
3 I	+ 5724.9	+ 4.2	− 15.3	− 5630.2	+ 187.9	− 208.4
4 I	+ 1.4	− 12.1	− 22.6	− 4.0	+ 27.9	− 21.9
5 I	− 47.7	+ 7.9	+ 4.1	+ 46.9	+ 1.8	+ 1.3
6 I	+ 14.0	− 2.3	+ 2.1	− 14.4	− 4.0	− 0.3
7 I	− 41.5	+ 57.1	+ 54.6	+ 41.9	− 5.3	− 0.5
8 I	− 5.8	− 8.3	− 8.4	+ 6.1	− 0.5	
II	− 1340.7	− 82.3	− 0.9	− 1289.8	− 554.6	+ 231.6
2 II	+10930.4	− 1159.0	+ 1065.5	+10367.5	+ 244.1	− 146.5
3 II	− 3779.0	+ 539.8	− 523.1	− 3638.3	− 69.4	+ 141.1
4 II	− 294.8	+ 40.7	− 33.9	− 250.5	− 2.5	+ 14.8
5 II	+ 2.5	+ 2.9	+ 1.1	+ 20.6	+ 0.6	+ 2.5
6 II	− 9.0	− 0.3	+ 1.9	− 2.2		+ 0.9
7 II	− 2.4	− 0.3	+ 1.3	− 0.3		
III	+ 9598.9	− 2097.8	− 1894.6	− 9736.8	+ 145.1	− 261.1
2 III	+ 166.8	+ 64.2	− 62.6	− 66.6	+ 2.7	− 2.5
IV	− 8330.7	+ 1305.0	+ 754.2	+ 9254.2	+ 525.7	− 787.6
2 IV	+ 748.2	− 120.8	− 111.6	− 32.3	− 131.7	+ 217.7
3 IV	− 153.2	− 78.5	+ 95.3	− 77.5	− 14.6	+ 22.4
4 IV	− 12.4	− 11.7	+ 9.6	− 14.1	− 0.4	− 0.4
V	− 5031.4	− 17.9	+ 509.0	− 2272.5	− 842.5	+ 1273.3
2 V	− 37.1	− 32.5	+ 11.8	− 87.9	+ 1.6	− 5.5
VI	+ 4932.9	− 540.5	+ 540.7	+ 4849.2	+ 3.7	− 46.1
2 VI	− 14.5	+ 1.8	− 1.8	− 16.4		
VII	− 3739.2	+ 227.2	− 192.7	− 3658.9	− 202.1	− 114.3
2 VII	+ 1507.9	− 166.7	+ 166.1	+ 1497.3	+ 1.5	− 7.4
3 VII	− 80.4	+ 13.6	− 9.6	− 56.7	− 0.7	+ 0.5
VIII	− 3513.0	+ 213.1	+ 218.7	+ 3500.3	− 72.0	+ 85.4
2 VIII	− 3.2	+ 1.4	+ 0.9	+ 2.7		
IX	+ 2208.5	− 55.3	− 72.4	− 2188.4	+ 226.2	− 236.6
2 IX	− 778.1	+ 36.1	+ 36.1	+ 779.4	− 9.2	+ 12.0
3 IX	+ 65.9	+ 3.6	+ 3.5	− 66.1	+ 0.6	− 0.7
4 IX	− 1.1			+ 1.1		
X	+ 1826.7	− 182.2	− 135.1	− 1854.9	+ 59.7	− 91.2
2 X	+ 46.1	+ 43.3	+ 39.6	− 43.5	+ 1.4	− 0.7

	ξ_1		η_1		ζ_1	
	cos	sin	cos	sin	cos	sin
0 XI	− 699.7		+ 75.5		− 202.6	
XI	+ 1118.5	− 5.6	− 9.4	+ 901.6	+ 129.9	+ 143.4
2 XI	+ 463.6	− 31.7	+ 28.9	+ 433.4	+ 38.2	+ 42.2
3 XI	+ 100.7	− 15.4	+ 13.1	+ 97.4	+ 5.2	+ 6.6
4 XI	+ 23.3	− 5.2	+ 4.9	+ 21.1	+ 0.8	+ 1.0
5 XI	+ 5.8	− 1.5	+ 1.7	+ 6.1		
XII	− 1092.5	+ 72.3	− 70.3	− 1081.8	− 22.9	− 10.7
2 XII	+ 122.5	− 13.7	+ 12.7	+ 112.6		
XIII	− 833.4	+ 99.3	− 1.6	− 402.4	− 56.4	+ 90.2
2 XIII		− 2.2		− 4.0		
XIV	+ 494.5	+ 26.8	+ 26.3	− 491.7	+ 22.7	− 26.9
2 XIV	− 50.0	+ 1.9	+ 2.0	+ 52.5		
XV	− 300.6	+ 19.9	− 19.6	− 300.2	− 4.2	− 1.6
2 XV	+ 8.0	− 0.8	+ 0.9	+ 7.7		
XVI	+ 1128.7	+ 45.6	+ 42.7	− 1120.9	+ 21.1	− 22.1
XVII	− 1034.5	+ 161.6	− 156.4	− 1022.7	− 18.6	+ 16.8
XVIII	+ 428.2	− 47.6	+ 47.9	+ 432.3		− 1.4
XIX	+ 290.3	− 153.9	+ 137.5	+ 272.2	− 8.9	+ 17.8
XX	− 268.1	+ 43.2	− 42.6	− 269.3	− 3.7	+ 3.0
XXI	+ 245.3	+ 13.5	+ 13.2	− 263.7	+ 3.3	− 3.6
XXII	− 237.0	+ 146.4	+ 103.9	+ 234.6	− 83.3	− 5.1
XXIII	− 222.1	− 13.4	− 15.2	+ 218.3	− 11.5	+ 10.6
XXIV	+ 204.2	− 30.9	− 40.0	+ 7.4	+ 20.9	− 39.4
XXV	− 192.0	+ 7.5	+ 7.8	+ 192.5	− 1.7	+ 2.1
XXVI	+ 191.1	+ 141.0	+ 126.8	− 187.8	− 1.4	− 2.7
XXVII	+ 162.0	− 86.7	+ 110.3	− 238.0	+ 29.9	− 4.7
XXVIII	− 148.9	+ 21.4	+ 52.2	+ 188.6	+ 13.8	− 9.1
XXIX	+ 122.3	+ 11.8	+ 11.8	− 122.9	+ 4.2	− 4.5
XXX	− 79.0	+ 5.0	− 5.4	− 84.8		
XXXI	− 72.0	+ 10.1	− 8.1	− 66.4	− 2.4	+ 0.9
XXXII	+ 44.0	+ 50.4	− 46.7	+ 39.6	− 4.0	+ 0.9
XXXIII	+ 32.1	+ 3.7	+ 3.5	− 32.4	+ 0.8	− 0.9
XXXIV	+ 30.7	− 3.5	+ 3.0	+ 29.9		
XXXV	− 25.6	− 3.1	+ 11.6	− 1.8	− 1.7	+ 2.6
XXXVI	− 21.9	+ 1.3	− 1.1	− 20.7		
XXXVII	+ 20.8	+ 7.2	+ 20.2	+ 113.3	− 5.5	+ 8.6
XXXVIII	− 20.6	− 30.8	+ 37.4	0.0	− 2.5	+ 4.9
XXXIX	− 16.8	− 21.4	− 22.0	+ 18.8	+ 15.5	− 1.0
XL	− 17.7	+ 3.1	− 3.0	− 17.2		
XLI	− 10.1	+ 1.9	+ 2.1	+ 10.4	− 2.1	+ 0.2
XLII	− 9.4	+ 16.8	+ 15.9	+ 9.2	− 1.9	0.0
XLIII	− 8.9	+ 1.2	+ 1.2	+ 9.3	+ 4.3	− 2.5
XLIV	− 7.7	− 3.0	+ 5.4	− 2.0		
XLV	− 2.3	− 11.4	+ 4.1	− 17.7	0.0	− 1.6

Tables for the equation of the centre and the radius vector have been superseded by solving KEPLER's problem in the manner I have shown in Vol. III. No. 53 of the *Astronomical Journal*, viz.: — If we suppose one of the radii vectores to turn uniformly about one of the foci, describing therefore the mean anomaly,

the other radius vector will then, in not very eccentric ellipses, describe nearly the true anomaly. This auxiliary anomaly, denoting with v', we have, simply,

$$\cot \tfrac{1}{2} v' = \frac{1-e}{1+e} \cot \tfrac{1}{2} M.$$

The logarithm of the constant factor $\frac{1-e}{1+e}$ is for Melpomene $= 9.8078595$, and $\log p = 0.3398226$ for the computation of the radius vector by means of $r = \frac{p}{1+e\cos v}$.

The correction c, to be added to v' in order to get the true anomaly v, is given in Table II., with M as the argument. For the construction of this table I had c developed in the following series: —

$$\begin{aligned} c = &- 526.495 \sin M \\ &+ 2232.957 \sin 2M \\ &+ 819.532 \sin 3M \\ &+ 245.033 \sin 4M \end{aligned} \qquad \begin{aligned} c = &+ 68.825 \sin 5M \\ &+ 18.848 \sin 6M \\ &+ 5.096 \sin 7M \\ &+ 1.395 \sin 8M \end{aligned} \qquad \begin{aligned} c = &+ 0.373 \sin 9M \\ &+ 0.103 \sin 10M \\ &+ 0.053 \sin 11M \end{aligned}$$

Example for computing a Place from the Tables.

1861, Feb. $5^d\ 5^h\ 58^m\ 15^s$ Washington M. T. = Feb. $5^d\ 12^h$ Berlin M. T.

We write down on a scrap of paper the constants to be used. From Table V. the logarithms of

$\log e$	$\log \frac{1-e}{1+e}$	$\log p$	$\cos(x_1 x)$	$\cos(y_1 x)$	$\cos(z_1 x)$
9.337800	9.807860	0.339823	9.982068	9.427362n	8.943100

$\cos(x_1 y)$	$\cos(y_1 y)$	$\cos(z_1 y)$	$\cos(x_1 z)$	$\cos(y_1 z)$	$\cos(z_1 z)$
9.449004	9.966656	9.400622n	8.144356n	9.424948	9.984015

and from Table VI.,

A'	B'	C'	$\log \sin a$	$\log \sin b$	$\log \sin c$
105° 34′ 42″.6	16° 53′ 23″.8	357° 0′ 0″.6	9.998323	9.985806	9.425543

M = mean anomaly, and t = time since 1854.0 are taken from Table I.

	M	t
1861,	84° 42′ 59″.56	+7.00068
Feb.	8 47 3.72	0.08488
5 days	1 25 0.60	0.01369
5 hours	3 32.53	0.00057
58 minutes	41.09	
15 seconds	0.17	
	94 59 17.67	+7.09982

$\cot \frac{1}{2} M$	47° 29′ 38″.8	9.962142
$\frac{1-e}{1+e} \cot \frac{1}{2} M = \cot \frac{1}{2} v'$	59 30 30.4	9.770002
v'	119 1 0.8	
From Table II. c —	26 10.1	
v	118 34 50.7	
$\cos v$		9.679789n
$e \cos v$	—0.104133	9.017589n
$1 + \cos v$	0.895867	9.952243
r		0.387580

Formation of the Arguments from Table III.*

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
1861,	237.828	322.545	78.202	200.37	162.92	9.81	47.26	30.94	153.11
Feb.	357.425	6.209	1.058	3.63	9.85	21.20	14.99	346.07	348.64
5 days	359.584	1.001	0.171	0.59	1.59	3.42	2.42	357.75	358.17
6 hours	359.979	0.050	0.008	0.03	0.08	0.17	0.12	359.89	359.91
	234.816	329.805	79.439	204.62	174.44	34.60	64.79	14.65	139.83

		XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.
1861,	316.03	84.72	131.98	125.46	68.40	216.7	268.8	332.4	179.2
Feb.	358.48	8.78	23.78	16.05	339.85	32.6	343.5	27.4	38.8
5 days	359.76	1.42	3.84	2.59	356.75	5.3	357.3	4.4	6.3
6 hours	359.99	0.07	0.19	0.13	359.84	0.3	359.9	0.2	0.3
	314.26	94.99	159.79	144.23	44.84	254.9	249.5	4.4	224.6

	XIX.	XX.	XXI.	XXII.	XXIII.	XXIV.	XXV.	XXVI.	XXVII.
1861,	118.9	57.1	184.1	309.5	193.9	3.3	221.5	71.7	34.2
Feb.	8.3	36.2	334.7	350.8	355.9	13.5	328.5	353.3	359.5
5 days	1.3	5.8	355.9	358.5	359.3	2.2	354.9	358.9	359.9
6 hours	0.1	0.3	359.8	359.9	0.0	0.1	359.8	0.0	0.0
	128.6	99.4	154.5	298.7	189.1	19.1	184.7	63.9	33.6

	XXVIII.	XXIX.	XXX.	XXXI.	XXXII.	XXXIII.	XXXIV.	XXXV.	XXXVI.
1861,	278.6	343.7	301.4	294.9	356.8	259.0	348.7	50.6	26.1
Feb.	4.7	331.1	41.3	33.6	5.7	322.3	56.3	28.5	50.1
5 days	0.8	355.3	6.7	5.4	0.9	353.9	9.1	4.6	8.1
6 hours	0.0	359.8	0.3	0.3	0.1	359.7	0.5	0.2	0.4
	284.1	309.9	349.7	334.2	3.5	214.9	54.6	83.9	84.7

	XXXVII.	XXXVIII.	XXXIX.	XL.	XLI.	XLII.	XLIII.	XLIV.	XLV.
1861,	88.0	203.7	187	226	24	140	147	166	288
Feb.	22.3	17.1	348	54	338	333	341	23	26
5 days	3.6	2.8	358	9	357	356	357	4	4
6 hours	0.2	0.1	0	0	0	0	0	0	0
	114.1	223.7	173	289	359	109	125	193	318

With these Arguments the perturbations are computed from Table IV.

* These Arguments being expressed in degrees and decimals, 360.0, 720.0, or 1080 0, must be subtracted when one of the sums is greater than one of those numbers.

	ξ_1		η_1		ζ_1				
	+	−	+	−	+	−			
Terms with t	2608.5		264.9		502.0		$\cos(x_1 x)\ \xi_1$	+ 4820.0	
I	1008.2		2527.7		95.0		$\cos(y_1 x)\ \eta_1$	− 265.9	
II	491.3			397.8		50.1	$\cos(z_1 x)\ \zeta_1$	+ 49.0	
III		43.5		988.5		21.9	ξ	+ 4603.1	
IV	753.4			460.7		8.8			
V	497.6			68.8	96.4		$\cos(x_1 y)\ \xi_1$	+ 1412.5	
VI	375.1		318.2			2.3	$\cos(y_1 y)\ \eta_1$	+ 920.2	
VII		240.2		232.2		19.6	$\cos(z_1 y)\ \zeta_1$	− .140.4	
VIII		334.7	109.8			4.8	η	+ 2192.3	
IX		185.2		217.4		33.9			
X	136.1		127.3		10.8		$\cos(x_1 z)\ \xi_1$	− 70.0	
XI		119.6	79.7			12.0	$\cos(y_1 z)\ \eta_1$	+ 264.3	
XII	115.2			37.1	1.8		$\cos(z_1 z)\ \zeta_1$	+ 537.9	
XIII	73.6			23.1	9.9		ζ	+ 732.2	
XIV	37.1			27.5		0.3			Reduction to the apparent equinox.
XV	5.1		29.8		0.3		$\sin(A'+v)$	224° 9′ 33.″3	9.843018$_n$
XVI		43.8	104.2		1.4		$r \sin a$		0.385903
XVII		101.9		23.5		1.7	x		0.228921$_n$
XVIII		27.2		33.8	0.1		$\sin(B'+v)$	135 28 14.5	9.845888
XIX		30.1	12.7		1.9		$r \sin b$		0.373386
XX	8.7			25.8	0.3		y		0.219274
XXI		21.7		12.3		0.5	$\sin(C'+v)$	115 34 51.3	9.955195
XXII		24.2		15.6		3.6	$r \sin c$		9.813123
XXIII	22.1			2.0	1.0		z		9.768318
XXIV	18.3			3.5	0.7				
XXV	19.1			2.5	0.1				
XXVI	21.2			11.3		0.3	y	+1.656815	
XXVII	8.7			3.9	2.2		η	+ 2192	
XXVIII		5.7		17.0	1.2		Y	−0.614699	
XXIX	7.0		10.2		0.6		$\Delta \cos\delta' \sin\alpha'$	+1.044308	0.018828
XXX		7.9	0.9				x	−1.694031	
XXXI		6.9	2.0			0.3	ξ	+ 4603	
XXXII	4.6			4.4		0.4	X	+0.723955	
XXXIII		2.8	1.6				$\Delta \cos\delta' \cos\alpha'$	−0.965473	9.984740$_n$
XXXIV	1.5		2.6				$\sin\alpha'$		9.865861
XXXV		0.6		0.1			$\tan\alpha'$	132° 45′ 13.″3	0.034088$_n$
XXXVI		0.1		2.1					$\alpha = 132°\ 45'\ 35.''5$
XXXVII		0.2	9.5		1.0				
XXXVIII	3.6			2.7		0.1	z	+0.586568	
XXXIX	1.5		2.4			1.5	ζ	+ 732	
XL		0.9	1.5				Z	−0.266747	
XLI		1.0	0.2			0.2	$\Delta \sin\delta'$	+0.320553	9.505900
XLII	1.9		0.3				$\Delta \cos\delta'$		0.152967
XLIII	0.6		0.7			0.4	$\cos\delta'$		9.969240
XLIV	0.8			0.5			$\tan\delta'$	+12° 42′ 5.″8	9.352933
XLV	0.6		1.5		0.1				$\delta = +12\ 42\ 3.4$
	6221.4	1198.2	3607.7	2614.1	720.8	162.7	Δ		0.163727
ξ_1, η_1, ζ_1	+ 5023.2		+ 993.6		+ 558.1		α' and δ' are referred to the mean equinox 1861.0.		
L	3.700980		2.997212		2.746712				

My computations for 1861, with the osculating elements for 1854.0 and the special perturbations by Jupiter and Saturn, give for the same time: —

$\alpha =$	132° 45′ 33.″3
$\delta =$	+ 12 42 2.0
$\Delta\alpha$	2.2
$\Delta\delta$	1.4

By this close agreement between the two different computations, the correctness of the tables is satisfactorily proved.

For the computation of an exact opposition ephemeris, it will be necessary only to compute the perturbations from 16 to 16 days from the tables, and then to interpolate them twice in the middle, in order to get them from 4 to 4 days, with which interval such ephemerides are commonly calculated. For an approximate ephemeris for the whole year, the terms multiplied with the time and the first four equations will be sufficient, and also a direct computation of the perturbations only from 40 to 40 days, with afterwards two interpolations in the middle, if the ephemeris is to be computed from 10 to 10 days.

TABLE I.

FOR THE MEAN ANOMALY.

The times are referred to the meridian of Washington.

Years.	*M*	*t*	Years.	*M*	*t*
	° ′ ″			° ′ ″	
1852 *B*	233 17 25.88	− 1.99863	1877	300 42 39.50	+23.00068
1853	336 43 9.59	− 0.99932	1878	44 8 23.22	24.00000
1854	80 8 53.31	0.00000	1879	147 34 6.93	24.99932
1855	183 34 37.03	+ 0.99932	1880 *B*	251 16 50.77	26.00137
1856 *B*	287 17 20.86	2.00137	1881	354 42 34.48	27.00068
1857	30 43 4.58	3.00068	1882	98 8 18.20	28.00000
1858	134 8 48.29	4.00000	1883	201 34 1.92	28.99932
1859	237 34 32.01	4.99932	1884 *B*	305 16 45.75	30.00137
1860 *B*	341 17 15.85	6.00137	1885	48 42 29.47	31.00068
1861	84 42 59.56	7.00068	1886	152 8 13.18	32.00000
1862	188 8 43.28	8.00000	1887	255 33 56.90	32.99932
1863	291 34 26.99	8.99932	1888 *B*	359 16 40.74	34.00137
1864 *B*	35 17 10.83	10.00137	1889	102 42 24.45	35.00068
1865	138 42 54.55	11.00068	1890	206 8 8.17	36.00000
1866	242 8 38.26	12.00000	1891	309 33 51.88	36.99932
1867	345 34 21.98	12.99932	1892 *B*	53 16 35.72	38.00137
1868 *B*	89 17 5.81	14.00137	1893	156 42 19.44	39.00068
1869	192 42 49.53	15.00068	1894	260 8 3.15	40.00000
1870	296 8 33.25	16.00000	1895	3 33 46.87	40.99932
1871	39 34 16.96	16.99932	1896 *B*	107 16 30.70	42.00137
1872 *B*	143 17 0.80	18.00137	1897	210 42 14.42	43.00068
1873	246 42 44.51	19.00068	1898	314 7 58.14	44.00000
1874	350 8 28.23	20.00000	1899	57 33 41.85	44.99932
1875	93 34 11.95	20.99932	1900 *B*	161 16 25.69	+46.00137
1876 *B*	197 16 55.78	+22.00137			

Months.	*M*	*t*	Days.	*M*	*t*
	° ′ ″			° ′ ″	
January	0 0 0.00	+0.00000	1	0 17 0.12	+0.00274
February	8 47 3.72	0.08488	2	0 34 0.24	0.00548
March	16 43 7.08	0.16154	3	0 51 0.36	0.00821
April	25 30 10.78	0.24642	4	1 8 0.48	0.01095
May	34 0 14.38	0.32856	5	1 25 0.60	0.01369
June	42 47 18.10	0.41344	6	1 42 0.72	0.01643
July	51 17 21.68	0.49558	7	1 59 0.84	0.01917
August	60 4 25.40	0.58046	8	2 16 0.96	0.02190
September	68 51 29.12	0.66534	9	2 33 1.08	0.02464
October	77 21 32.72	0.74748	10	2 50 1.20	0.02738
November	86 8 36.44	0.83236	20	5 40 2.40	0.05476
December	94 38 40.04	+0.91450	30	8 30 3.60	+0.08214

In Bissextile Years one day must be subtracted from the date in the first two months.

TABLE I.—*Concluded.*

FOR THE MEAN ANOMALY.

The times are referred to the meridian of Washington.

Hours.	*M*	*t*	Hours.	*M*	*t*
	′ ″			′ ″	
1	0 42.51	+0.00011	13	9 12.57	+0.00149
2	1 25.01	0.00023	14	9 55.07	0.00160
3	2 7.52	0.00034	15	10 37.58	0.00172
4	2 50.02	0.00046	16	11 20.08	0.00183
5	3 32.53	0.00057	17	12 2.59	0.00195
6	4 15.03	0.00069	18	12 45.09	0.00206
7	4 57.54	0.00080	19	13 27.60	0.00218
8	5 40.04	0.00092	20	14 10.10	0.00229
9	6 22.55	0.00103	21	14 52.61	0.00241
10	7 5.05	0.00114	22	15 35.11	0.00252
11	7 47.56	0.00126	23	16 17.62	0.00264
12	8 30.06	+0.00137	24	17 0.12	+0.00275

	M			*M*	
	For Minutes.	For Seconds.		For Minutes.	For Seconds.
	″	″		″	″
1	0.71	0.01	31	21.96	0.36
2	1.42	0.02	32	22.67	0.37
3	2.13	0.03	33	23.38	0.39
4	2.83	0.05	34	24.09	0.40
5	3.54	0.06	35	24.80	0.41
6	4.25	0.07	36	25.50	0.42
7	4.96	0.08	37	26.21	0.44
8	5.67	0.09	38	26.92	0.45
9	6.38	0.11	39	27.63	0.46
10	7.08	0.12	40	28.34	0.47
11	7.79	0.13	41	29.05	0.48
12	8.50	0.14	42	29.76	0.50
13	9.21	0.15	43	30.47	0.51
14	9.91	0.16	44	31.17	0.52
15	10.62	0.17	45	31.88	0.53
16	11.33	0.19	46	32.59	0.54
17	12.04	0.20	47	33.29	0.55
18	12.75	0.21	48	34.00	0.57
19	13.46	0.22	49	34.71	0.58
20	14.17	0.23	50	35.42	0.59
21	14.88	0.25	51	36.12	0.60
22	15.58	0.26	52	36.83	0.61
23	16.29	0.27	53	37.54	0.62
24	17.00	0.28	54	38.25	0.64
25	17.71	0.29	55	38.96	0.65
26	18.42	0.31	56	39.67	0.66
27	19.13	0.32	57	40.38	0.67
28	19.84	0.33	58	41.09	0.68
29	20.54	0.34	59	41.80	0.70
30	21.25	0.35	60	42.51	0.71

TABLE II.

FOR THE CORRECTION c TO BE ADDED TO THE AUXILIARY ANOMALY v'.

Argument = M. For $M > 180°$ the Argument is $360° - M$, and the sign of c to be reversed.

Arg.	c	Diff.	Arg.	c	Diff.	Arg.	c	Diff.	Arg.	c	Diff
°	′ ″	″	°	′ ″	″	°	′ ″	″	°	′ ″	″
0.0	0 0.00		22.5	+40 58.26		45.0	+39 29.45		67.5	+ 8 45.17	
		+68.81			+28.54			−29.21			−45.84
.5	+ 1 8.81	68.77	23.0	41 26.80	27.06	.5	39 0.24	30.08	68.0	7 59.33	45.76
1.0	2 17.58	68.68	.5	41 53.88	25.63	46.0	38 30.16	30.93	.5	7 13.57	45.67
.5	3 26.26	68.53	24.0	42 19.51	24.15	.5	37 59.23	31.75	69.0	6 27.90	45.55
2.0	4 34.79	68.35	.5	42 43.66	22.69	47.0	37 27.48	32.55	.5	5 42.35	45.42
.5	5 43.14	68.13	25.0	43 6.35	21.21	.5	36 54.93	33.32	70.0	4 56.93	45.28
3.0	6 51.27	67.83	.5	43 27.56	19.74	48.0	36 21.61	34.07	.5	4 11.65	45.12
.5	7 59.10	67.51	26.0	43 47.30	18.27	.5	35 47.54	34.79	71.0	3 26.53	44.95
4.0	9 6.61	67.14	.5	44 5.57	16.80	49.0	35 12.75	35.50	.5	2 41.58	44.76
.5	10 13.75		27.0	44 22.37		.5	34 37.25		72.0	1 56.82	
		66.72			15.32			36.18			44.57
5.0	+11 20.47		.5	+44 37.69		50.0	+34 1.07		.5	+ 1 12.25	
		+66.27			+13.87			−36.82			−44.35
.5	12 26.74	65.76	28.0	44 51.56	12.40	.5	33 24.25	37.45	73.0	+ 0 27.90	44.13
6.0	13 32.50	65.21	.5	45 3.96	10.94	51.0	32 46.80	38.06	.5	− 0 16.23	43.90
.5	14 37.71	64.62	29.0	45 14.90	9.50	.5	32 8.74	38.64	74.0	1 0.13	43.65
7.0	15 42.33	63.98	.5	45 24.40	8.06	52.0	31 30.10	39.20	.5	1 43.78	43.39
.5	16 46.31	63.30	30.0	45 32.46	6.61	.5	30 50.90	39.73	75.0	2 27.17	43.12
8.0	17 49.61	62.59	.5	45 39.07	5.20	53.0	30 11.17	40.24	.5	3 10.29	42.83
.5	18 52.20	61.84	31.0	45 44.27	3.77	.5	29 30.93	40.74	76.0	3 53.12	42.55
9.0	19 54.04	61.04	.5	45 48.04	2.36	54.0	28 50.19	41.20	.5	4 35.67	42.24
.5	20 55.08		32.0	45 50.40		.5	28 8.99		77.0	5 17.91	
		60.20			+ 0.96			41.63			41.93
10.0	+21 55.28		.5	+45 51.38		55.0	+27 27.36		.5	− 5 59.84	
		+59.33			− 0.41			−42.06			−41.61
.5	22 54.61	58.42	33.0	45 50.97	1.78	.5	26 45.30	42.46	78.0	6 41.45	41.28
11.0	23 53.03	57.48	.5	45 49.19	3.14	56.0	26 2.84	42.88	.5	7 22.73	40.93
.5	24 50.51	56.51	34.0	45 46.05	4.48	.5	25 20.01	43.19	79.0	8 3.66	40.56
12.0	25 47.02	55.49	.5	45 41.57	5.81	57.0	24 36.82	43.51	.5	8 44.24	40.22
.5	26 42.51	54.45	35.0	45 35.76	7.11	.5	23 53.31	43.83	80.0	9 24.46	39.85
13.0	27 36.96	53.37	.5	45 28.65	8.42	58.0	23 9.48	44.11	.5	10 4.31	39.48
.5	28 30.33	52.27	36.0	45 20.23	9.70	.5	22 25.37	44.38	81.0	10 43.79	39.09
14.0	29 22.60	51.13	.5	45 10.53	10.95	59.0	21 40.99	44.62	.5	11 22.88	38.69
.5	30 13.73		37.0	44 59.58		.5	20 56.37		82.0	12 1.57	
		49.97			12.19			44.85			38.30
15.0	+31 3.70		.5	+44 47.39		60.0	+20 11.52		.5	−12 39.87	
		+48.78			−13.42			−45.05			−37.89
.5	31 52.48	47.56	38.0	44 33.97	14.62	.5	19 26.47	45.23	83.0	13 17.76	37.47
16.0	32 40.04	46.32	.5	44 19.35	15.80	61.0	18 41.24	45.40	.5	13 55.23	37.06
.5	33 26.36	45.06	39.0	44 3.55	16.97	.5	17 55.84	45.54	84.0	14 32.29	36.63
17.0	34 11.42	43.77	.5	43 46.58	18.10	62.0	17 10.30	45.67	.5	15 8.92	36.19
.5	34 55.19	42.47	40.0	43 28.48	19.23	.5	16 24.63	45.77	85.0	15 45.11	35.75
18.0	35 37.66	41.14	.5	43 9.25	20.32	63.0	15 38.86	45.85	.5	16 20.86	35.31
.5	36 18.80	39.80	41.0	42 48.93	21.41	.5	14 53.01	45.93	86.0	16 56.17	34.86
19.0	36 58.60	38.43	.5	42 27.52	22.45	64.0	14 7.08	45.97	.5	17 31.03	34.40
.5	37 37.03		42.0	42 5.07		.5	13 21.11		87.0	18 5.43	
		37.05			23.49			46.01			33.94
20.0	+38 14.08		.5	+41 41.58		65.0	+12 35.10		.5	−18 39.37	
		+35.67			−24.50			−46.03			−33.48
.5	38 49.75	34.26	43.0	41 17.08	25.48	.5	11 49.07	46.02	88.0	19 12.85	33.00
21.0	39 24.01	32.84	.5	40 51.60	26.45	66.0	11 3.05	46.00	.5	19 45.85	32.53
.5	39 56.85	31.42	44.0	40 25.15	27.39	.5	10 17.05	45.97	89.0	20 18.38	32.04
22.0	40 28.27	+29.99	.5	39 57.76	−28.31	67.0	9 31.08	−45.91	.5	20 50.42	−31.56
.5	+40 58.26		45.0	+39 29.45		.5	+ 8 45.17		90.0	−21 21.98	

TABLE II.—*Concluded.*

FOR THE CORRECTION c TO BE ADDED TO THE AUXILIARY ANOMALY v'.

Argument = M. For $M > 180°$ the Argument is $360° - M$, and the sign of c to be reversed.

Arg.	c	Diff.	Arg.	c	Diff.	Arg.	c	Diff.	Arg.	c	Diff
°	′ ″	″	°	′ ″	″	°	′ ″	″	°	′ ″	″
90.0	−21 21.98		112.5	−36 9.15		135.0	−34 18.97		157.5	−20 16.21	
		−31·07			− 7·76			+12·03			+24·36
.5	21 53.05	30·58	113.0	36 16.91	7·27	.5	34 6.94	12·39	158.0	19 51.85	24·53
91.0	22 23.63	30·09	.5	36 24.18	6·76	136.0	33 54.55	12·76	.5	19 27.32	24·71
.5	22 53.72	29·59	114.0	36 30.94	6·26	.5	33 41.80	13·10	159.0	19 2.61	24·88
92.0	23 23.31	29·09	.5	36 37.20	5·77	137.0	33 28.70	13·45	.5	18 37.73	25·05
.5	23 52.40	28·58	115.0	36 42.97	5·28	.5	33 15.25	13·79	160.0	18 12.68	25·21
93.0	24 20.98	28·07	.5	36 48.25	4·78	138.0	33 1.46	14·14	.5	17 47.47	25·37
.5	24 49.05	27·57	116.0	36 53.03	4·30	.5	32 47.32	14·47	161.0	17 22.10	25·52
94.0	25 16.62	27·05	.5	36 57.33	3·81	139.0	32 32.85	14·81	.5	16 56.58	25·68
.5	25 43.67	26·54	117.0	37 1.14	3·32	.5	32 18.04	15·14	162.0	16 30.90	25·82
95.0	−26 10.21		.5	−37 4.46		140.0	−32 2.90		.5	−16 5.08	
		−26·03			− 2·85			+15·46			+25·97
.5	26 36.24	25·51	118.0	37 7.31	2·36	.5	31 47.44	15·79	163.0	15 39.11	26·11
96.0	27 1.75	24·99	.5	37 9.67	1·89	141.0	31 31.65	16·10	.5	15 13.00	26·24
.5	27 26.74	24·46	119.0	37 11.55	1·42	.5	31 15.55	16·42	164.0	14 46.76	26·38
97.0	27 51.20	23·94	.5	37 12.97	0·94	142.0	30 59.13	16·72	.5	14 20.38	26·50
.5	28 15.14	23·42	120.0	37 13.91	0·47	.5	30 42.41	17·04	165.0	13 53.88	26·63
98.0	28 38.56	22·89	.5	37 14.38	− 0·01	143.0	30 25.37	17·33	.5	13 27.25	26·74
.5	29 1.45	22·37	121.0	37 14.39	+ 0·46	.5	30 8.04	17·63	166.0	13 0.51	26·86
99.0	29 23.82	21·84	.5	37 13.93	0·92	144.0	29 50.41	17·93	.5	12 33.65	26·97
.5	29 45.66	21·32	122.0	37 13.01	1·37	.5	29 32.48	18·22	167.0	12 6.68	27·07
100.0	−30 6.98		.5	−37 11.64		145.0	−29 14.26		.5	−11 39.61	
		−20·79			+ 1·83			+18·51			+27·18
.5	30 27.77	20·26	123.0	37 9.81	2·28	.5	28 55.75	18·79	168.0	11 12.43	27·28
101.0	30 48.03	19·73	.5	37 7.53	2·72	146.0	28 36.96	19·07	.5	10 45.15	27·37
.5	31 7.76	19·21	124.0	37 4.81	3·17	.5	28 17.89	19·35	169.0	10 17.78	27·46
102.0	31 26.97	18·67	.5	37 1.64	3·60	147.0	27 58.54	19·61	.5	9 50.32	27·55
.5	31 45.64	18·15	125.0	36 58.04	4·04	.5	27 38.93	19·88	170.0	9 22.77	27·63
103.0	32 3.79	17·62	.5	36 54.00	4·47	148.0	27 19.05	20·14	.5	8 55.14	27·71
.5	32 21.41	17·09	126.0	36 49.53	4·90	.5	26 58.91	20·40	171.0	8 27.43	27·79
104.0	32 38.50	16·56	.5	36 44.63	5·32	149.0	26 38.51	20·65	.5	7 59.64	27·85
.5	32 55.06	16·04	127.0	36 39.31	5·74	.5	26 17.86	20·90	172.0	7 31.79	27·92
105.0	−33 11.10		.5	−36 33.57		150.0	−25 56.96		.5	− 7 3.87	
		−15·51			+ 6·16			+21·15			+27·98
.5	33 26.61	14·98	128.0	36 27.41	6·58	.5	25 35.81	21·40	173.0	6 35.89	28·04
106.0	33 41.59	14·46	.5	36 20.83	6·99	151.0	25 14.41	21·63	.5	6 7.85	28·09
.5	33 56.05	13·94	129.0	36 13.84	7·40	.5	24 52.78	21·86	174.0	5 39.76	28·14
107.0	34 9.99	13·41	.5	36 6.44	7·81	152.0	24 30.92	22·09	.5	5 11.62	28·18
.5	34 23.40	12·90	130.0	35 58.63	8·22	.5	24 8.83	22·32	175.0	4 43.44	28·23
108.0	34 36.30	12·38	.5	35 50.41	8·61	153.0	23 46.51	22·53	.5	4 15.21	28·27
.5	34 48.68	11·86	131.0	35 41.80	9·01	.5	23 23.98	22·75	176.0	3 46.94	28·29
109.0	35 0.54	11·34	.5	35 32.79	9·40	154.0	23 1.23	22·96	.5	3 18.65	28·33
.5	35 11.88	10·83	132.0	35 23.39	9·79	.5	22 38.27	23·17	177.0	2 50.32	28·35
110.0	−35 22.71		.5	−35 13.60		155.0	−22 15.10		.5	− 2 21.97	
		−10·31			+10·17			+23·38			+28·37
.5	35 33.02	9·80	133.0	35 3.43	10·56	.5	21 51.72	23·58	178.0	1 53.60	28·39
111.0	35 42.82	9·28	.5	34 52.87	10·93	156.0	21 28.14	23·78	.5	1 25.21	28·40
.5	35 52.10	8·78	134.0	34 41.94	11·30	.5	21 4.36	23·98	179.0	0 56.81	28·40
112.0	36 0.88	− 8·27	.5	34 30.64	+11·67	157.0	20 40.38	+24·17	.5	− 0 28.41	+28·41
.5	−36 9.15		135.0	−34 18.97		.5	−20 16.21		180.0	0 0.00	

TABLE III.

FOR THE ARGUMENTS.

A. For the different Years. The times are referred to the meridian of Washington.

Years.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
	°	°	°	°	°	°	°	°	°
1852 *B*	150.924	24.214	326.061	175.14	199.35	281.72	257.50	68.56	277.63
1853	120.598	97.317	338.513	217.92	315.23	171.35	74.04	264.48	143.88
1854	90.273	170.420	350.966	260.69	71.11	60.99	250.57	100.40	10.12
1855	59.947	243.524	3.418	303.47	187.00	310.63	67.10	296.32	236.37
1856 *B*	29.539	316.828	15.905	346.37	303.19	200.94	244.12	131.79	102.25
1857	359.213	29.931	28.357	29.14	59.07	90.58	60.65	327.71	328.50
1858	328.888	103.035	40.810	71.92	174.96	340.22	237.18	163.63	194.74
1859	298.562	176.138	53.263	114.70	290.84	229.85	53.71	359.55	60.99
1860 *B*	268.154	249.442	65.749	157.59	47.04	120.17	230.73	195.02	286.87
1861	237.828	322.545	78.202	200.37	162.92	9.81	47.26	30.94	153.11
1862	207.503	35.648	90.654	243.15	278.80	259.44	223.79	226.86	19.36
1863	177.178	108.752	103.108	285.93	34.68	149.08	40.33	62.78	245.60
1864 *B*	146.769	182.056	115.594	328.82	150.88	39.40	217.34	258.25	111.48
1865	116.444	255.159	128.047	11.60	266.76	289.03	33.87	94.17	337.73
1866	86.119	328.263	140.500	54.38	22.64	178.67	210.41	290.09	203.97
1867	55.793	41.366	152.953	97.16	138.53	68.30	26.94	126.01	70.22
1868 *B*	25.385	114.670	165.440	140.05	254.72	318.62	203.95	321.48	296.10
1869	355.060	197.774	177.893	182.83	10.62	208.26	20.49	157.41	162.35
1870	324.734	260.877	190.346	225.61	126.49	97.90	197.02	353.33	28.59
1871	294.409	333.981	202.799	268.39	242.37	347.53	13.55	189.25	254.84
1872 *B*	264.001	47.284	215.286	311.29	358.57	237.85	190.57	24.72	120.72
1873	233.676	120.388	227.740	354.06	114.45	127.49	7.10	220.64	346.96
1874	203.350	193.492	240.192	36.84	230.33	17.12	183.63	56.56	213.21
1875	173.025	266.595	252.646	79.62	346.22	266.76	0.17	252.48	79.46
1876 *B*	142.617	339.899	265.134	122.52	102.42	157.08	177.18	87.95	305.34
1877	112.292	53.003	277.586	165.29	218.30	46.72	353.71	283.87	171.58
1878	81.967	126.107	290.040	208.07	334.18	296.35	170.25	119.80	37.84
1879	51.642	199.210	302.494	250.85	90.06	185.99	346.78	315.71	264.07
1880 *B*	21.234	272.514	314.981	293.74	206.26	76.30	163.80	151.19	129.95
1881	350.908	345.618	327.434	336.53	322.14	325.95	340.33	347.11	356.20
1882	320.583	58.721	339.887	19.30	78.02	215.58	156.86	183.03	222.44
1883	290.258	131.825	352.340	62.08	193.91	105.22	333.39	18.95	88.69
1884 *B*	259.849	205.129	4.827	104.98	310.11	355.54	150.41	214.42	314.57
1885	229.524	278.232	17.280	147.76	65.99	245.17	326.94	50.34	180.82
1886	199.198	351.335	29.732	190.53	181.87	134.81	143.47	246.26	47.06
1887	168.873	64.439	42.185	233.31	297.75	24.44	320.00	82.18	273.31
1888 *B*	138.465	137.743	54.672	276.21	53.95	274.76	137.02	277.65	139.19
1889	108.139	210.846	67.125	318.98	169.83	164.40	313.55	113.58	5.43
1890	77.814	283.950	79.578	1.76	285.71	54.03	130.09	309.49	231.68
1891	47.489	357.053	92.031	44.54	41.59	303.67	306.62	145.41	97.92
1892 *B*	17.080	70.357	104.517	87.44	157.79	193.99	123.63	340.88	323.80
1893	346.755	143.460	116.970	130.23	273.68	83.63	300.17	176.81	190.05
1894	316.430	216.564	129.423	172.99	29.56	333.26	116.70	12.73	56.30
1895	286.104	289.667	141.876	215.77	145.44	222.90	293.23	208.65	282.54
1896 *B*	255.696	2.971	154.363	258.67	261.64	113.22	110.25	44.12	148.42
1897	225.371	76.075	166.816	301.49	17.52	2.85	286.78	240.04	14.67
1898	195.045	149.178	179.268	344.22	133.30	252.49	103.31	75.96	240.91
1899	164.720	222.232	191.721	27.00	249.28	142.12	279.84	271.88	107.16
1900 *B*	134.311	295.585	204.208	69.90	5.48	32.44	96.86	107.35	333.04

TABLE III.—*Continued.*

FOR THE ARGUMENTS.

A. For the different Years. The times are referred to the meridian of Washington.

Years.	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.
	°	°	°	°	°	°	°	°	°
1852 *B*	116.98	233.29	130.80	223.57	44.34	4.1	219.5	305.9	28.3
1853	99.11	336.72	50.76	52.55	167.16	27.5	25.1	268.7	124.8
1854	81.24	80.15	330.72	241.53	289.98	50.9	190.7	231.4	221.3
1855	63.37	183.58	250.68	70.52	52.79	74.3	356.3	194.1	317.8
1856 *B*	45.44	287.29	171.41	260.02	174.96	98.7	161.3	157.8	55.5
1857	27.57	30.72	91.37	89.01	297.78	122.1	326.9	120.5	152.0
1858	9.70	134.15	11.33	277.99	60.59	145.5	132.5	83.3	248.5
1859	351.82	237.58	291.29	106.98	183.41	168.9	298.1	46.0	345.0
1860 *B*	333.90	341.29	212.02	296.48	305.58	193.3	103.2	9.6	82.7
1861	316.03	84.72	131.98	125.46	68.40	216.7	268.8	332.4	179.2
1862	298.16	188.15	51.94	314.45	191.21	240.1	74.4	295.1	275.7
1863	280.29	291.57	331.90	143.43	314.03	263.5	240.0	257.8	12.2
1864 *B*	262.36	35.29	252.63	332.93	76.20	287.9	45.0	221.5	110.0
1865	244.49	138.72	172.59	161.92	199.01	311.3	210.6	184.2	206.5
1866	226.62	242.14	92.55	350.91	321.83	334.7	16.2	146.9	303.0
1867	208.75	345.57	12.51	179.89	84.65	358.1	181.8	109.7	39.5
1868 *B*	190.82	89.29	293.24	9.39	206.81	22.5	346.9	73.3	137.2
1869	172.95	192.71	213.20	198.38	329.63	45.9	152.5	36.0	233.7
1870	155.08	296.14	133.16	27.37	92.45	69.3	318.1	358.8	330.2
1871	137.21	39.57	53.12	216.35	215.27	92.7	123.7	321.5	66.7
1872 *B*	119.29	143.28	333.85	45.85	337.43	117.1	288.7	285.1	164.4
1873	101.42	246.71	253.81	234.84	100.25	140.5	94.3	247.9	260.9
1874	83.54	350.14	173.77	63.83	223.07	163.9	259.9	210.6	357.4
1875	65.67	93.57	93.74	252.81	345.89	187.3	65.5	173.4	93.9
1876 *B*	47.75	197.28	14.46	82.32	106.05	211.7	230.6	137.0	191.6
1877	29.88	300.71	294.42	271.30	230.87	235.1	36.2	99.7	288.1
1878	12.01	44.14	214.39	100.29	353.69	258.5	201.8	62.5	24.6
1879	354.13	147.57	134.35	289.27	116.50	281.9	7.4	25.2	121.1
1880 *B*	336.21	251.28	55.08	118.78	238.67	306.3	172.4	348.8	218.9
1881	318.34	354.71	335.04	307.76	1.49	329.7	338.0	311.6	315.4
1882	300.47	98.14	255.00	136.75	124.31	353.1	143.6	274.3	51.9
1883	282.60	201.57	174.96	325.73	247.12	16.5	309.2	237.0	148.4
1884 *B*	264.68	305.28	95.69	155.23	9.29	41.0	114.3	200.7	246.1
1885	246.80	48.71	15.65	344.22	132.11	64.4	279.9	163.4	342.6
1886	228.93	152.14	295.61	173.20	254.92	87.7	85.5	126.1	79.1
1887	211.06	255.57	215.57	2.19	17.74	111.1	251.1	88.9	175.6
1888 *B*	193.14	359.28	136.30	191.69	139.91	135.6	56.1	52.5	273.3
1889	175.26	102.71	56.26	20.68	262.73	159.0	221.7	15.2	9.8
1890	157.39	206.14	336.22	209.66	25.54	182.4	27.3	338.0	106.3
1891	139.52	309.56	256.18	38.65	148.36	205.7	192.9	300.7	202.8
1892 *B*	121.60	53.28	176.91	228.15	270.53	230.2	358.0	264.3	300.5
1893	103.73	156.71	96.87	57.14	33.34	253.6	163.6	227.1	37.0
1894	85.85	260.13	16.83	246.12	156.16	277.0	329.2	189.8	133.5
1895	67.98	3.56	296.79	75.11	278.98	300.4	134.7	152.6	230.0
1896 *B*	50.06	107.28	217.52	264.61	41.15	324.8	299.8	116.2	327.8
1897	32.19	210.70	137.48	93.59	163.96	348.2	105.4	78.9	64.3
1898	14.31	314.13	57.44	282.58	286.78	11.6	271.0	41.7	160.8
1899	356.44	57.56	337.40	111.56	49.60	35.0	76.6	4.4	257.2
1900 *B*	338.52	161.27	258.13	301.07	171.76	59.4	241.7	328.0	355.0

TABLE III.—*Continued.*

FOR THE ARGUMENTS.

A. For the different Years. The times are referred to the meridian of Washington.

Years.	XIX.	XX.	XXI.	XXII.	XXIII.	XXIV.	XXV.	XXVI.	XXVII.
	°	°	°	°	°	°	°	°	°
1852 *B*	316.3	179.2	346.2	209.8	267.9	14.5	322.0	58.8	83.0
1853	54.3	245.4	48.4	100.9	219.7	173.1	311.0	340.3	77.6
1854	152.4	311.6	110.5	352.1	171.5	331.8	300.0	261.8	72.2
1855	250.4	17.7	172.7	243.2	123.3	130.5	289.2	183.3	66.8
1856 *B*	348.6	85.1	234.0	134.1	75.0	289.6	277.2	104.5	61.3
1857	86.6	151.2	296.2	25.2	26.8	88.2	266.3	26.0	55.9
1858	184.7	217.4	358.4	276.4	338.6	246.9	255.3	307.5	50.5
1859	282.7	283.6	60.5	167.5	290.4	45.5	244.4	228.9	45.1
1860 *B*	20.9	350.9	121.9	58.4	242.1	204.6	232.4	150.2	39.7
1861	118.9	57.1	184.1	309.5	193.9	3.3	221.5	71.7	34.2
1862	217.0	123.2	246.2	200.7	145.7	162.0	210.6	353.2	28.8
1863	315.0	189.4	308.4	91.8	97.5	320.6	199.6	274.6	23.4
1864 *B*	53.2	256.7	369.7	342.7	49.1	119.7	187.7	195.9	18.0
1865	151.3	322.9	71.9	233.8	0.9	278.4	176.7	117.4	12.5
1866	249.3	29.1	134.1	125.0	312.7	77.0	165.8	38.9	7.1
1867	347.3	95.2	196.2	16.1	264.5	235.7	154.9	320.3	1.7
1868 *B*	85.5	162.6	257.6	267.0	216.2	34.8	142.9	241.6	356.3
1869	183.6	228.7	319.7	158.1	168.0	193.4	132.0	163.1	350.8
1870	281.6	294.9	21.9	49.3	119.8	352.1	121.0	84.5	345.4
1871	19.6	1.1	84.1	300.4	71.6	150.8	110.1	6.0	340.0
1872 *B*	117.9	68.4	145.4	191.3	23.3	309.9	98.2	287.3	334.6
1873	215.9	134.6	207.6	82.4	335.1	108.5	87.2	208.8	329.2
1874	313.9	200.8	269.8	333.6	286.9	267.2	76.3	130.2	323.7
1875	51.9	266.9	331.9	224.7	238.7	65.8	65.3	51.7	318.3
1876 *B*	150.2	334.3	33.3	115.6	190.4	224.9	53.4	333.0	312.9
1877	248.2	40.4	95.5	6.8	142.2	23.6	42.5	254.5	307.5
1878	346.2	106.6	157.6	257.9	94.0	182.3	31.5	175.9	302.0
1879	84.2	172.8	219.8	149.0	45.8	340.9	20.6	97.4	296.6
1880 *B*	182.5	240.1	281.1	39.9	357.5	140.0	8.6	18.7	291.2
1881	280.5	306.3	343.3	291.1	309.3	298.7	357.7	300.2	285.8
1882	18.5	12.4	45.5	182.2	261.1	97.3	346.8	221.6	280.4
1883	116.5	78.6	107.6	73.4	212.9	256.0	335.8	143.1	274.9
1884 *B*	214.8	145.9	169.0	324.2	164.5	55.1	323.9	64.4	269.5
1885	312.8	212.1	231.2	215.4	116.3	213.7	312.9	345.9	264.1
1886	50.8	278.3	293.3	106.5	68.1	12.4	302.0	267.3	258.7
1887	148.8	344.4	355.5	357.7	19.9	171.1	291.0	188.8	253.2
1888 *B*	247.1	51.8	56.8	248.5	331.6	330.2	279.1	110.1	247.8
1889	345.1	118.0	119.0	139.7	283.4	128.8	268.2	31.5	242.4
1890	83.1	184.1	181.2	30.8	235.2	287.5	257.2	313.0	237.0
1891	181.1	250.3	243.3	282.0	187.0	86.1	246.3	234.5	231.5
1892 *B*	279.4	317.6	304.7	172.8	138.7	245.2	234.3	155.8	226.1
1893	17.4	23.8	6.9	64.0	90.5	43.9	223.4	77.2	220.7
1894	115.4	90.0	69.0	315.1	42.3	202.6	212.5	358.7	215.3
1895	213.4	156.1	131.2	206.3	354.1	1.2	201.5	280.2	209.9
1896 *B*	311.7	223.5	192.5	97.1	305.8	160.3	189.6	201.4	204.4
1897	49.7	289.6	254.7	348.3	257.6	319.0	178.6	122.9	199.0
1898	147.7	355.8	316.9	239.4	209.4	117.6	167.7	44.4	193.6
1899	245.7	62.0	19.0	130.6	161.2	276.3	156.8	325.9	188.2
1900 *B*	344.0	129.3	80.4	21.5	112.8	75.4	144.8	247.1	182.7

TABLE III.—*Continued.*

FOR THE ARGUMENTS.

A. For the different Years. The times are referred to the meridian of Washington.

Years.	XXVIII.	XXIX.	XXX.	XXXI.	XXXII.	XXXIII.	XXXIV.	XXXV.	XXXVI.
	°	°	°	°	°	°	°	°	°
1852 *B*	141.2	171.1	237.4	330.1	107.3	297.8	134.9	272.0	110.7
1853	196.4	190.4	4.2	6.0	174.9	213.7	78.2	247.2	340.9
1854	251.7	209.7	131.0	41.8	242.6	129.7	21.6	222.4	211.2
1855	306.9	229.2	257.8	77.7	310.3	45.6	324.9	197.6	81.4
1856 *B*	2.3	247.7	26.0	114.6	18.2	320.4	270.1	173.7	313.3
1857	57.5	267.1	152.8	150.4	85.9	236.3	213.5	148.9	183.5
1858	112.7	286.4	279.6	186,3	153.5	152.3	156.8	124.1	53.8
1859	168.0	305.8	46.4	222.1	221.2	68.3	100.2	99.3	284.0
1860 *B*	223.4	324.3	174.6	259.1	289.1	343.0	45.3	75.4	155.9
1861	278.6	343.7	301.4	294.9	356.8	259.0	348.7	50.6	26.1
1862	333.8	3.1	68.2	330.7	64.5	174.9	292.0	25.7	256.4
1863	29.0	22.5	195.0	6.6	132.1	90.9	235.4	0.9	126.6
1864 *B*	84.4	40.9	323.2	43.5	200.0	5.6	180.5	337.0	358.5
1865	139.6	60.3	90.0	79.4	267.7	281.6	123.9	312.2	228.7
1866	194.9	79.7	216.8	115.2	335.4	197.5	67.2	287.4	99.0
1867	250.1	99.1	343.7	151.0	43.1	113.5	10.6	262.6	329.2
1868 *B*	305.5	117.5	111.8	188.0	110.9	28.2	315.8	238.7	201.1
1869	0.7	136.9	238.6	223.8	178.6	304.2	259.1	213.9	71.3
1870	56.0	156.3	5.4	259.7	246.3	220.2	202.5	189.1	301.6
1871	111.2	175.7	132.3	295.5	314.0	136.1	145.8	164.3	171.8
1872 *B*	166.6	194.1	260.4	332.4	21.9	50.9	91.0	140.4	43.7
1873	221.8	213.5	27.2	8.3	89.5	326.8	34.3	115.6	274.0
1874	277.0	232.9	154.1	44.1	157.2	242.8	337.7	90.8	144.2
1875	332.3	252.3	280.9	80.0	224.9	158.7	281.0	66.0	14.4
1876 *B*	27.6	270.8	49.0	116.9	292.8	73.5	226.2	42.1	246.3
1877	82.9	290.2	175.8	152.7	0.5	349.4	169.6	17.3	116.6
1878	138.1	309.5	302.7	188.6	68.2	265.4	112.9	352.5	346.8
1879	193.3	328.9	69.5	224.4	135.8	181.4	56.3	327.7	217.1
1880 *B*	248.7	347.4	197.6	261.3	203.7	96.1	1.4	303.8	88.9
1881	304.0	6.8	324.5	297.2	271.4	12.1	304.8	279.0	319.2
1882	359.2	26.2	91.3	333.0	339.1	288.0	248.1	254.2	189.4
1883	54.4	45.5	218.1	8.9	46.8	204.0	191.5	229.4	59.7
1884 *B*	109.8	64.0	346.2	45.8	114.6	118.7	136.7	205.5	291.5
1885	165.0	83.4	113.1	81.6	182.3	34.7	80.0	180.7	161.8
1886	220.3	102.8	239.9	117.5	250.0	310.7	23.4	155.9	32.0
1887	275.5	122.2	366.7	153.3	317.7	226.6	326.7	131.1	262.3
1888 *B*	330.9	140.6	134.9	190.2	25.6	141.4	271.9	107.2	134.1
1889	26.1	160.0	261.7	226.1	93.2	57.3	215.2	82.4	4.6
1890	81.3	179.4	28.5	261.9	160.9	333.3	158.6	57.6	234.6
1891	136.6	198.8	155.3	297.8	228.6	249.2	101.9	32.8	104.9
1892 *B*	192.0	217.3	283.5	334.7	296.5	164.0	47.1	8.9	336.7
1893	247.2	236.6	50.3	10.6	4.2	79.9	350.4	344.1	207.0
1894	302.4	256.0	177.1	46.4	71.8	355.9	293.8	319.2	77.2
1895	357.6	275.4	303.9	82.2	139.5	271.9	237.1	294.4	307.5
1896 *B*	53.0	293.9	72.1	119.2	207.4	186.6	182.3	270.6	179.3
1897	108.3	313.3	198.9	155.0	275.1	102.6	125.6	245.7	49.6
1898	163.5	332.6	325.7	190.8	342.8	18.5	69.0	220.9	279.8
1899	218.7	352.0	92.5	226.7	50.4	294.5	12.4	196.1	150.1
1900 *B*	274.1	10.5	220.7	263.6	118.3	209.2	317.5	172.2	22.0

TABLE III.—*Continued.*

FOR THE ARGUMENTS.

A. For the different Years. The times are referred to the meridian of Washington.

Years.	XXXVII.	XXXVIII.	XXXIX.	XL.	XLI.	XLII.	XLIII.	XLIV.	XLV.
	°	°	°	°	°	°	°	°	°
1852 *B*	247.8	189.6	1	286	161	103	10	214	63
1853	149.9	31.1	221	199	266	147	146	128	8
1854	52.0	232.5	82	112	11	192	281	43	313
1855	314.0	73.9	303	25	116	236	56	317	258
1856 *B*	216.8	275.9	164	300	220	279	191	233	203
1857	118.9	117.4	24	213	325	324	326	147	148
1858	21.0	318.8	245	126	70	8	101	62	93
1859	283.1	160.2	106	39	175	52	237	336	38
1860 *B*	185.9	2.2	327	313	279	96	371	252	344
1861	88.0	203.7	187	226	24	140	147	166	288
1862	350.1	45.1	48	140	129	184	282	81	233
1863	252.2	246.5	269	53	234	229	57	355	178
1864 *B*	155.0	88.5	129	327	339	272	192	271	124
1865	57.1	290.0	350	240	84	316	327	185	69
1866	319.2	131.4	211	153	188	1	102	100	14
1867	221.3	332.8	72	67	293	45	238	14	318
1868 *B*	124.1	174.8	292	341	38	88	12	290	264
1869	26.2	16.3	153	254	143	133	148	204	209
1870	288.2	217.7	14	167	248	177	283	119	154
1871	190.3	59.2	235	80	352	221	58	33	99
1872 *B*	93.1	261.1	95	355	97	265	193	308	44
1873	355.2	102.6	316	268	202	309	328	223	349
1874	257.3	304.0	177	181	307	353	103	138	294
1875	159.4	145.5	38	94	52	38	239	52	239
1876 *B*	62.2	347.4	258	9	156	81	13	327	185
1877	324.3	188.9	119	282	261	125	148	262	130
1878	226.4	30.3	340	195	6	170	284	156	74
1879	128.5	231.8	201	108	111	214	59	71	19
1880 *B*	31.3	73.8	61	23	215	257	194	346	325
1881	293.4	275.2	282	296	320	302	329	261	270
1882	195.5	116.6	143	209	65	346	104	175	215
1883	97.6	318.1	4	122	170	30	239	90	160
1884 *B*	0.4	160.1	224	37	274	74	14	5	105
1885	262.5	1.5	85	310	19	118	149	280	50
1886	164.5	202.9	306	223	124	162	285	194	355
1887	66.6	44.4	166	136	229	207	60	109	300
1888 *B*	329.4	306.4	27	50	333	250	195	23	246
1889	231.5	87.8	248	323	78	294	330	299	191
1890	133.6	289.2	109	236	183	339	105	213	135
1891	35.7	130.7	329	149	288	23	240	128	80
1892 *B*	298.5	332.7	190	64	32	66	15	43	26
1893	200.6	174.1	51	337	137	111	150	318	331
1894	102.7	15.5	272	250	242	155	286	232	276
1895	4.8	217.0	132	163	347	199	61	147	221
1896 *B*	267.6	59.0	353	78	91	243	195	62	166
1897	169.7	260.4	214	351	196	287	331	336	111
1898	71.8	101.8	74	264	301	331	106	251	56
1899	333.8	303.3	295	177	46	15	241	166	1
1900 *B*	236.7	145.3	156	92	150	59	16	81	307

TABLE III.—*Continued.*

FOR THE ARGUMENTS.

B. Variations of the Arguments for the different Months. The times are referred to the meridian of Washington.

Months.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
	°	°	°	°	°	°	°	°	°
January	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00
February	357.425	6.209	1.058	3.63	9.85	21.20	14.99	346.07	348.64
March	355.098	11.817	2.014	6.91	18.74	40.35	28.53	333.48	338.38
April	352.523	18.026	3.072	10.54	28.59	61.55	43.52	319.55	327.02
May	350.031	24.035	4.096	14.06	38.12	82.07	58.03	306.07	316.03
June	347.456	30.244	5.154	17.69	47.97	103.27	73.02	292.14	304.67
July	344.964	36.253	6.178	21.21	57.50	123.79	87.53	278.66	293.68
August	342.389	42.462	7.236	24.84	67.35	144.99	102.52	264.73	282.32
September	339.814	48.671	8.294	28.47	77.19	166.19	117.51	250.80	270.96
October	337.322	54.680	9.318	31.99	86.72	186.71	132.02	237.32	259.97
November	334.747	60.889	10.376	35.62	96.57	207.91	147.01	223.39	248.61
December	332.255	66.898	11.400	39.14	106.10	228.43	161.52	209.91	237.62

Months.	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.
	°	°	°	°	°	°	°	°	°
January	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0
February	358.48	8.78	23.78	16.05	339.85	32.6	343.5	27.4	38.8
March	357.11	16.72	45.26	30.55	321.65	62.0	328.6	52.2	73.8
April	355.59	25.50	69.04	46.60	301.50	94.6	312.1	79.6	112.6
May	354.12	34.00	92.05	62.13	282.00	126.1	296.1	106.1	150.1
June	352.60	42.78	115.83	78.18	261.85	158.7	279.6	133.5	188.9
July	351.13	51.28	138.84	93.71	242.35	190.2	263.6	160.0	226.4
August	349.61	60.06	162.62	109.76	222.20	222.8	247.1	187.4	265.2
September	348.09	68.84	186.39	125.81	202.05	255.3	230.6	214.8	303.9
October	346.62	77.34	209.40	141.34	182.55	286.8	214.6	241.3	341.4
November	345.10	86.12	233.18	157.39	162.40	319.4	198.1	268.7	20.2
December	343.63	94.62	256.19	172.92	142.90	350.9	182.1	295.3	57.7

Months.	XIX.	XX.	XXI.	XXII.	XXIII.	XXIV.	XXV.	XXVI.	XXVII.
	°	°	°	°	°	°	°	°	°
January	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
February	8.3	36.2	334.7	350.8	355.9	13.5	328.5	353.3	359.5
March	15.8	68.9	311.9	342.4	352.2	25.6	300.1	347.3	359.1
April	24.1	105.1	286.6	333.2	348.1	39.1	268.6	340.6	358.6
May	32.2	140.1	262.1	324.2	344.1	52.2	238.1	334.2	358.2
June	40.5	176.3	236.8	315.0	340.0	65.6	206.6	327.5	357.7
July	48.6	211.3	212.3	306.1	336.0	78.7	176.1	321.0	357.3
August	56.9	247.5	187.0	296.8	331.9	92.1	144.6	314.3	356.8
September	65.2	283.7	161.7	287.6	327.8	105.6	113.1	307.6	356.3
October	73.3	318.7	137.2	278.6	323.8	118.6	82.6	301.2	355.9
November	81.6	354.9	111.9	269.4	319.7	132.1	51.1	294.5	355.4
December	89.7	29.9	87.4	260.5	315.7	145.2	20.6	288.0	355.0

In Bissextile Years subtract one day from the date in the first two months.

TABLE III.—*Continued.*

FOR THE ARGUMENTS.

B. Variations of the Arguments for the different Months. The times are referred to the meridian of Washington.

Months.	XXVIII.	XXIX.	XXX.	XXXI.	XXXII.	XXXIII.	XXXIV.	XXXV.	XXXVI.
	°	°	°	°	°	°	°	°	°
January	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
February	4.7	331.1	41.3	33.6	5.7	322.3	56.3	28.5	50.1
March	8.9	304.9	78.7	64.0	10.9	288.3	107.2	54.2	95.4
April	13.5	276.0	120.0	97.6	16.6	250.6	163.5	82.6	145.5
May	18.0	248.0	160.0	130.2	22.2	214.1	218.0	110.2	194.0
June	22.7	219.1	201.3	163.8	27.9	176.4	274.4	138.6	244.1
July	27.2	191.1	241.3	196.4	33.5	139.9	328.9	166.2	292.6
August	31.8	162.2	282.6	230.0	39.2	102.2	25.2	194.6	342.7
September	36.5	133.3	323.9	263.6	44.9	64.5	81.6	223.1	32.8
October	41.0	105.3	3.9	296.2	50.5	28.0	136.1	250.6	81.3
November	45.6	76.4	45.2	329.8	56.2	350.3	192.4	279.1	131.4
December	50.1	48.4	85.2	2.4	61.8	313.8	246.9	306.6	179.9

Months.	XXXVII.	XXXVIII.	XXXIX.	XL.	XLI.	XLII.	XLIII.	XLIV.	XLV.
	°	°	°	°	°	°	°	°	°
January	0.0	0.0	0	0	0	0	0	0	0
February	22.3	17.1	348	54	338	333	341	23	26
March	42.4	32.5	338	102	319	309	324	44	50
April	64.6	49.6	326	156	297	282	305	67	76
May	86.2	66.2	314	208	276	256	286	90	101
June	108.4	83.3	303	262	254	229	267	113	127
July	130.0	99.9	291	314	233	203	248	136	152
August	152.2	117.0	279	7	212	177	229	159	178
September	174.5	134.1	268	61	190	150	210	182	204
October	196.0	150.6	256	113	169	124	192	205	229
November	218.3	167.7	244	167	147	97	173	228	255
December	239.8	184.3	233	219	126	71	154	250	280

In Bissextile Years subtract one day from the date in the first two months.

TABLE III.—*Continued.*

FOR THE ARGUMENTS.

C. Variations of the Arguments for the different Days. The times are referred to the meridian of Washington.

Days.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
	°	°	°	°	°	°	°	°	°
1	359.917	0.200	0.034	0.12	0.32	0.68	0.48	359.55	359.63
2	359.834	0.401	0.068	0.23	0.64	1.37	0.97	359.10	359.27
3	359.751	0.601	0.102	0.35	0.95	2.05	1.45	358.65	358.90
4	359.667	0.801	0.137	0.47	1.27	2.74	1.93	358.20	358.53
5	359.584	1.001	0.171	0.59	1.59	3.42	2.42	357.75	358.17
6	359.501	1.202	0.205	0.70	1.90	4.10	2.90	357.30	357.80
7	359.418	1.402	0.239	0.82	2.22	4.79	3.39	356.85	357.43
8	359.335	1.602	0.273	0.94	2.54	5.47	3.87	356.40	357.07
9	359.252	1.803	0.307	1.06	2.86	6.16	4.35	355.95	356.70
10	359.169	2.003	0.341	1.17	3.18	6.84	4.84	355.51	356.34
20	358.338	4.006	0.683	2.34	6.35	13.68	9.67	351.01	352.67
30	357.508	6.009	1.024	3.52	9.53	20.52	14.51	346.52	349.01

Days.	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.
	°	°	°	°	°	°	°	°	°
1	359.95	0.28	0.77	0.52	359.35	1.1	359.5	0.9	1.3
2	359.90	0.57	1.53	1.04	358.70	2.1	358.9	1.8	2.5
3	359.85	0.85	2.30	1.55	358.05	3.2	358.4	2.7	3.8
4	359.80	1.13	3.07	2.07	357.40	4.2	357.9	3.5	5.0
5	359.76	1.42	3.84	2.59	356.75	5.3	357.3	4.4	6.3
6	359.71	1.70	4.60	3.11	356.10	6.3	356.8	5.3	7.5
7	359.66	1.98	5.37	3.62	355.45	7.4	356.3	6.2	8.8
8	359.61	2.27	6.14	4.14	354.80	8.4	355.7	7.1	10.0
9	359.56	2.55	6.90	4.66	354.15	9.5	355.2	8.0	11.3
10	359.51	2.83	7.67	5.18	353.50	10.5	354.7	8.8	12.5
20	359.02	5.67	15.34	10.36	347.00	21.0	349.4	17.7	25.0
30	358.53	8.50	23.01	15.53	340.50	31.5	344.0	26.5	37.5

Days.	XIX.	XX.	XXI.	XXII.	XXIII.	XXIV.	XXV.	XXVI.	XXVII.
	°	°	°	°	°	°	°	°	°
1	0.3	1.2	359.2	359.7	359.9	0.4	359.0	359.8	0.0
2	0.5	2.3	358.4	359.4	359.7	0.9	358.0	359.6	0.0
3	0.8	3.5	357.6	359.1	359.6	1.3	356.9	359.4	0.0
4	1.1	4.7	356.7	358.8	359.5	1.7	355.9	359.1	359.9
5	1.3	5.8	355.9	358.5	359.3	2.2	354.9	358.9	359.9
6	1.6	7.0	355.1	358.2	359.2	2.6	353.9	358.7	359.9
7	1.9	8.2	354.3	357.9	359.1	3.0	352.9	358.5	359.9
8	2.2	9.3	353.5	357.6	358.9	3.5	351.9	358.3	359.9
9	2.4	10.5	352.7	357.3	358.8	3.9	350.9	358.1	359.9
10	2.7	11.7	351.8	357.0	358.7	4.4	349.8	357.9	359.9
20	5.4	23.4	343.7	354.0	357.4	8.7	339.7	355.7	359.7
30	8.1	35.0	335.5	351.1	356.0	13.0	329.5	353.6	359.6

TABLE III.—*Continued.*

FOR THE ARGUMENTS.

C. Variations of the Arguments for the different Days. The times are referred to the meridian of Washington.

Days.	XXVIII.	XXIX.	XXX.	XXXI.	XXXII.	XXXIII.	XXXIV.	XXXV.	XXXVI.
	°	°	°	°	°	°	°	°	°
1	0.2	359.1	1.3	1.1	0.2	358.8	1.8	0.9	1.6
2	0.3	358.1	2.7	2.2	0.4	357.6	3.6	1.8	3.2
3	0.5	357.2	4.0	3.3	0.6	356.3	5.5	2.8	4.9
4	0.6	356.3	5.3	4.3	0.7	355.1	7.3	3.7	6.5
5	0.8	355.3	6.7	5.4	0.9	353.9	9.1	4.6	8.1
6	0.9	354.4	8.0	6.5	1.1	352.7	10.9	5.5	9.7
7	1.1	353.5	9.3	7.6	1.3	351.5	12.7	6.4	11.3
8	1.2	352.5	10.7	8.7	1.5	350.3	14.5	7.3	12.9
9	1.4	351.6	12.0	9.8	1.7	349.0	16.4	8.3	14.6
10	1.5	350.7	13.3	10.9	1.9	347.8	18.2	9.2	16.2
20	3.0	341.3	26.7	21.7	3.7	335.7	36.3	18.4	32.3
30	4.5	332.0	40.0	32.6	5.6	323.5	54.5	27.5	48.5

Days.	XXXVII.	XXXVIII.	XXXIX.	XL.	XLI.	XLII.	XLIII.	XLIV.	XLV.
	°	°	°	°	°	°	°	°	°
1	0.7	0.6	0	2	359	359	359	1	1
2	1.4	1.1	359	3	359	358	359	2	2
3	2.2	1.7	359	5	358	357	358	2	3
4	2.9	2.2	359	7	357	357	358	3	3
5	3.6	2.8	358	9	357	356	357	4	4
6	4.3	3.3	358	10	356	355	356	5	5
7	5.0	3.9	357	12	355	354	356	5	6
8	5.7	4.4	357	14	354	353	355	6	7
9	6.5	5.0	357	16	354	352	354	7	8
10	7.2	5.5	356	17	353	351	354	8	8
20	14.4	11.0	352	35	346	343	348	15	17
30	21.5	16.6	349	52	339	334	342	23	25

TABLE III.—*Continued.*

FOR THE ARGUMENTS.

D. Variations of the Arguments for the different Hours. The times are referred to the meridian of Washington.

Hours.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
	°	°	°	°	°	°	°	°	°
1	359.997	0.008	0.001	0.00	0.01	0.03	0.02	359.98	359.99
2	359.993	0.017	0.003	0.01	0.03	0.06	0.04	359.96	359.97
3	359.990	0.025	0.004	0.02	0.04	0.09	0.06	359.94	359.95
4	359.986	0.033	0.006	0.02	0.05	0.11	0.08	359.92	359.94
5	359.983	0.042	0.007	0.03	0.07	0.14	0.10	359.90	359.92
6	359.979	0.050	0.008	0.03	0.08	0.17	0.12	359.89	359.91
7	359.976	0.058	0.010	0.03	0.09	0.20	0.14	359.87	359.89
8	359.972	0.066	0.011	0.04	0.11	0.23	0.16	359.85	359.88
9	359.969	0.075	0.013	0.04	0.12	0.26	0.18	359.83	359.86
10	359.965	0.083	0.014	0.05	0.13	0.29	0.20	359.81	359.85
20	359.930	0.166	0.028	0.10	0.26	0.57	0.40	359.62	359.70

Hours.	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.
	°	°	°	°	°	°	°	°	°
1	0.00	0.01	0.03	0.02	359.97	0.0	0.0	0.0	0.1
2	0.00	0.02	0.06	0.04	359.95	0.1	0.0	0.1	0.1
3	359.99	0.04	0.10	0.07	359.92	0.1	359.9	0.1	0.2
4	359.99	0.05	0.13	0.09	359.89	0.2	359.9	0.2	0.2
5	359.99	0.06	0.16	0.11	359.87	0.2	359.9	0.2	0.3
6	359.99	0.07	0.19	0.13	359.84	0.3	359.9	0.2	0.3
7	359.99	0.08	0.22	0.15	359.81	0.3	359.9	0.3	0.4
8	359.98	0.10	0.26	0.17	359.78	0.4	359.8	0.3	0.4
9	359.98	0.11	0.29	0.20	359.76	0.4	359.8	0.3	0.5
10	359.98	0.12	0.32	0.22	359.73	0.4	359.8	0.4	0.5
20	359.96	0.24	0.64	0.24	359.46	0.9	359.6	0.7	1.0

Hours.	XIX.	XX.	XXI.	XXII.	XXIII.	XXIV.	XXV.	XXVI.	XXVII.
	°	°	°	°	°	°	°	°	°
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.1	359.9	0.0	0.0	0.0	359.9	0.0	0.0
3	0.0	0.2	359.9	0.0	0.0	0.1	359.9	0.0	0.0
4	0.0	0.2	359.9	0.0	0.0	0.1	359.8	0.0	0.0
5	0.1	0.2	359.8	359.9	0.0	0.1	359.8	0.0	0.0
6	0.1	0.3	359.8	359.9	0.0	0.1	359.8	0.0	0.0
7	0.1	0.3	359.8	359.9	0.0	0.1	359.7	0.0	0.0
8	0.1	0.4	359.7	359.9	0.0	0.1	359.7	0.0	0.0
9	0.1	0.4	359.7	359.9	0.0	0.2	359.6	0.0	0.0
10	0.1	0.5	359.7	359.9	0.0	0.2	359.6	0.0	0.0
20	0.2	1.0	359.3	359.8	0.0	0.4	359.2	0.0	0.0

TABLE III.—*Concluded.*

FOR THE ARGUMENTS.

D. Variations of the Arguments for the different Hours. The times are referred to the meridian of Washington.

Hours.	XXVIII.	XXIX.	XXX.	XXXI.	XXXII.	XXXIII.	XXXIV.	XXXV.	XXXVI.
	°	°	°	°	°	°	°	°	°
1	0.0	0.0	0.1	0.0	0.0	359.9	0.1	0.0	0.1
2	0.0	359.9	0.1	0.1	0.0	359.9	0.2	0.1	0.1
3	0.0	359.9	0.2	0.1	0.0	359.8	0.2	0.1	0.2
4	0.0	359.8	0.2	0.2	0.0	359.8	0.3	0.2	0.3
5	0.0	359.8	0.3	0.2	0.0	359.7	0.4	0.2	0.3
6	0.0	359.8	0.3	0.3	0.1	359.7	0.5	0.2	0.4
7	0.0	359.7	0.4	0.3	0.1	359.6	0.5	0.3	0.5
8	0.0	359.7	0.5	0.4	0.1	359.6	0.6	0.3	0.5
9	0.0	359.7	0.5	0.4	0.1	359.5	0.7	0.3	0.6
10	0.0	359.6	0.6	0.5	0.1	359.5	0.8	0.4	0.7
20	0.0	359.2	1.1	0.9	0.2	359.0	1.5	0.8	1.3

Hours.	XXXVII.	XXXVIII.	XXXIX.	XL.	XLI.	XLII.	XLIII.	XLIV.	XLV.
	°	°	°	°	°	°	°	°	°
1	0.0	0.0	0	0	0	0	0	0	0
2	0.1	0.1	0	0	0	0	0	0	0
3	0.1	0.1	0	0	0	0	0	0	0
4	0.1	0.1	0	0	0	0	0	0	0
5	0.2	0.1	0	0	0	0	0	0	0
6	0.2	0.1	0	0	0	0	0	0	0
7	0.2	0.2	0	0	0	0	0	0	0
8	0.2	0.2	0	1	0	0	0	0	0
9	0.3	0.2	0	1	0	0	0	0	0
10	0.3	0.2	0	1	0	0	0	0	0
20	0.6	0.5	0	1	359	359	0	1	1

TABLE IV.

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

Terms multiplied with t. Argument $= M$.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
0°	− 5.24		−684.22		−35.71		45°	+437.82		−360.75		+24.69	
		+14·39		+ 0·35		+1·12			+3·09		+10·32		+1·31
1	+ 9.15		683.87		34.59		46	440.91		350.43		26.00	
		14·36		0·78		1·14			2·82		10·28		1·29
2	23.51		683.09		33.45		47	443.73		340.15		27.29	
		14·32		1·21		1·16			2·54		10·24		1·28
3	37.83		681.88		32.29		48	446.27		329.91		28.57	
		14·26		1·65		1·18			2·29		10·17		1·27
4	52.09		680.23		31.11		49	448.56		319.74		29.84	
		14·18		2·06		1·20			2·02		10·11		1·26
5	66.27		678.17		29.91		50	450.58		309.63		31.10	
		14·10		2·48		1·22			1·78		10·05		1·24
6	80.37		675.69		28.69		51	452.36		299.58		32.34	
		13·98		2·89		1·24			1·52		9·97		1·23
7	94.35		672.80		27.45		52	453.88		289.61		33.57	
		13·85		3·29		1·26			1·29		9·89		1·22
8	108.20		669.51		26.19		53	455.17		279.72		34.79	
		13·71		3·69		1·27			1·05		9·82		1·20
9	121.91		665.82		24.92		54	456.22		269.90		35.99	
		13·56		4·09		1·29			0·82		9·73		1·18
10	+135.47		−661.73		−23.63		55	+457.04		−260.17		+37.17	
		+13·37		+ 4·46		+1·30			+0·60		+ 9·64		+1·17
11	148.84		657.27		22.33		56	457.64		250.53		38.34	
		13·19		4·85		1·32			0·38		9·55		1·16
12	162.03		652.42		21.01		57	458.02		240.98		39.50	
		12·98		5·23		1·33			+0·17		9·45		1·14
13	175.01		647.19		19.68		58	458.19		231.53		40.64	
		12·76		5·57		1·34			−0·03		9·35		1·13
14	187.77		641.62		18.34		59	458.16		222.18		41.77	
		12·54		5·93		1·35			0·22		9·25		1·11
15	200.31		635.69		16.99		60	457.94		212.93		42.88	
		12·29		6·27		1·36			0·41		9·14		1·09
16	212.60		629.42		15.63		61	457.53		203.79		43.97	
		12·05		6·58		1·38			0·59		9·04		1·08
17	224.65		622.84		14.25		62	456.94		194.75		45.05	
		11·80		6·90		1·38			0·77		8·93		1·06
18	236.45		615.94		12.87		63	456.17		185.82		46.11	
		11·53		7·20		1·39			0·94		8·81		1·04
19	247.98		608.74		11.48		64	455.23		177.01		47.15	
		11·24		7·48		1·39			1·11		8·70		1·03
20	+259.22		−601.26		−10.09		65	+454.12		−168.31		+48.18	
		+10·97		+ 7·75		+1·40			−1·27		+ 8·59		+1·01
21	270.19		593.51		8.69		66	452.85		159.72		49.19	
		10·67		8·01		1·41			1·43		8·47		0·99
22	280.86		585.50		7.28		67	451.42		151.25		50.18	
		10·37		8·25		1·41			1·58		8·36		0·98
23	291.23		577.25		5.87		68	449.84		142.89		51.16	
		10·06		8·48		1·42			1·72		8·24		0·96
24	301.29		568.77		4.45		69	448.12		134.65		52.12	
		9·75		8·70		1·42			1·86		8·12		0·94
25	311.04		560.07		3.03		70	446.26		126.53		53.06	
		9·42		8·90		1·42			2·00		7·99		0·92
26	320.46		551.17		1.61		71	444.26		118.54		53.98	
		9·10		9·09		1·42			2·13		7·88		0·91
27	329.56		542.08		− 0.19		72	442.13		110.66		54.89	
		8·76		9·27		1·42			2·25		7·75		0·89
28	338.32		532.81		+ 1.23		73	439.88		102.91		55.78	
		8·42		9·42		1·42			2·37		7·63		0·87
29	346.74		523.39		2.65		74	437.51		95.28		56.65	
		8·09		9·58		1·42			2·49		7·51		0·85
30	354.83		−513.81		+ 4.07		75	+435.02		− 87.77		+57.50	
		+ 7·79		+ 9·72		+1·41			−2·60		+ 7·38		+0·83
31	+362.62		504.09		5.48		76	432.42		80.39		58.33	
		7·45		9·84		1·42			2·70		7·27		0·82
32	370.07		494.25		6.90		77	429.72		73.12		59.15	
		7·14		9·95		1·41			2·80		7·14		0·79
33	377.21		484.30		8.31		78	426.92		65.98		59.94	
		6·80		10·05		1·40			2·90		7·02		0·78
34	384.01		474.25		9.71		79	424.02		58.96		60.72	
		6·47		10·13		1·40			3·00		6·89		0·76
35	390.48		464.12		11.11		80	421.02		52.07		61.48	
		6·15		10·21		1·40			3·09		6·78		0·75
36	396.63		453.91		12.51		81	417.93		45.29		62.23	
		5·82		10·26		1·38			3·17		6·65		0·72
37	402.45		443.65		13.89		82	414.76		38.64		62.95	
		5·50		10·30		1·38			3·26		6·54		0·71
38	407.95		433.35		15.27		83	411.50		32.10		63.66	
		5·18		10·34		1·38			3·33		6·42		0·69
39	413.13		423.01		16.65		84	408.17		25.68		64.35	
		4·87		10·36		1·36			3·41		6·30		0·67
40	+418.00		−412.65		+18.01		85	+404.76		− 19.38		+65.02	
		+ 4·57		+10·38		+1·36			−3·47		+ 6·18		+0·65
41	422.57		402.27		19.37		86	401.29		13.20		65.67	
		4·25		10·39		1·35			3·54		6·07		0·63
42	426.82		391.88		20.72		87	397.75		7.13		66.30	
		3·96		10·39		1·33			3·61		5·95		0·62
43	430.78		381.49		22.05		88	394.14		− 1.18		66.92	
		3·67		10·38		1·33			3·67		5·84		0·59
44	434.45		371.11		23.38		89	390.47		+ 4.66		67.51	
		+ 3·37		+10·36		+1·31			−3·72		+ 10.39		+0·56
45	+437.82		−360.75		+24.69		90	+386.75			+ 5·73	+68.09	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

Terms multiplied with t. Argument = M.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
°							°						
90	+386.75		+ 10.39		+68.09		135	+192.61		+173.00		+76.34	
		−3·78		+5·61		+0·56			−4·47		+1·96		−0·18
91	382.97		16.00		68.65		136	188.14		174.96		76.16	
		3·83		5·51		0·55			4·48		1·90		0·20
92	379.14		21.51		69.20		137	183.66		176.86		75.96	
		3·88		5·39		0·53			4·47		1·84		0·21
93	375.26		26.90		69.72		138	179.19		178.70		75.75	
		3·93		5·29		0·50			4·47		1·79		0·22
94	371.33		32.19		70.23		139	174.72		180.49		75.53	
		3·96		5·18		0·48			4·47		1·74		0·24
95	367.37		37.37		70.71		140	170.25		182.23		75.29	
		4·01		5·08		0·47			4·47		1·69		0·26
96	363.36		42.45		71.18		141	165.78		183.92		75.03	
		4·05		4·98		0·45			4·46		1·64		0·26
97	359.31		47.43		71.63		142	161.32		185.56		74.77	
		4·08		4·87		0·44			4·45		1·58		0·28
98	355.23		52.30		72.07		143	156.87		187.14		74.49	
		4·12		4·77		0·42			4·46		1·54		0·29
99	351.11		57.07		72.49		144	152.41		188.68		74.20	
		4·15		4·67		0·40			4·45		1·49		0·31
100	+346.96		+ 61.74		+72.89		145	+147.96		+190.17		+73.89	
		−4·18		+4·58		+0·38			−4·44		+1·44		−0·32
101	342.78		66.32		73.27		146	143.52		191.61		73.57	
		4·20		4·47		0·36			4·45		1·39		0·33
102	338.58		70.79		73.63		147	139.07		193.00		73.24	
		4·23		4·39		0·35			4·43		1·34		0·35
103	334.35		75.18		73.98		148	134.64		194.34		72.89	
		4·26		4·28		0·33			4·44		1·30		0·36
104	330.09		79.46		74.31		149	130.20		195.64		72.53	
		4·28		4·20		0·31			4·43		1·26		0·37
105	325.81		83.66		74.62		150	125.77		196.90		72.16	
		4·30		4·10		0·30			4·43		1·21		0·39
106	321.51		87.76		74.92		151	121.34		198.11		71.77	
		4·32		4·02		0·27			4·42		1·17		0·39
107	317.19		91.78		75.19		152	116.92		199.28		71.38	
		4·34		3·92		0·26			4·42		1·12		0·41
108	312.85		95.70		75.45		153	112.50		200.40		70.97	
		4·35		3·84		0·25			4·42		1·08		0·43
109	308.50		99.54		75.70		154	108.08		201.48		70.54	
		4·37		3·76		0·22			4·41		1·04		0·43
110	+304.13		+103.30		+75.92		155	+103.67		+202.52		+70.11	
		−4·38		+3·67		+0·21			−4·41		+1·00		−0·45
111	299.75		106.97		76.13		156	99.26		203.52		69.66	
		4·40		3·58		0·19			4·41		0·96		0·46
112	295.35		110.55		76.32		157	94.85		204.48		69.20	
		4·41		3·51		0·18			4·40		0·92		0·47
113	290.94		114.06		76.50		158	90.45		205.40		68.73	
		4·42		3·42		0·16			4·40		0·88		0·48
114	286.52		117.48		76.66		159	86.05		206.28		68.25	
		4·43		3·35		0·14			4·40		0·84		0·50
115	282.09		120.83		76.80		160	81.65		207.12		67.75	
		4·43		3·27		0·13			4·40		0·80		0·51
116	277.66		124.10		76.93		161	77.25		207.92		67.24	
		4·45		3·19		0·11			4·39		0·76		0·52
117	273.21		127.29		77.04		162	72.86		208.68		66.72	
		4·45		3·12		0·09			4·39		0·72		0·53
118	269.76		130.41		77.13		163	68.47		209.40		66.19	
		4·46		3·04		0·08			4·39		0·69		0·54
119	264.30		133.45		77.21		164	64.08		210.09		65.65	
		4·46		2·97		0·06			4·39		0·65		0·55
120	+259.84		+136.42		+77.27		165	+ 59.69		+210.74		+65.10	
		−4·47		+2·90		+0·05			−4·39		+0·61		−0·56
121	255.37		139.32		77.32		166	55.30		211.35		64.54	
		4·48		2·82		0·03			4·38		0·57		0·58
122	250.89		142.14		77.35		167	50.92		211.92		63.96	
		4·47		2·76		+0·01			4·39		0·54		0·59
123	246.42		144.90		77.36		168	46.53		212.46		63.37	
		4·48		2·70		0·00			4·38		0·50		0·59
124	241.94		147.60		77.36		169	42.15		212.96		62.78	
		4·48		2·62		−0·02			4·38		0·46		0·61
125	237.46		150.22		77.34		170	37.77		213.42		62.17	
		4·49		2·56		0·03			4·39		0·43		0·62
126	232.97		152.78		77.31		171	33.38		213.85		61.55	
		4·48		2·49		0·05			4·38		0·39		0·63
127	228.49		155.27		77.26		172	29.00		214.24		60.92	
		4·49		2·43		0·06			4·38		0·35		0·63
128	224.00		157.70		77.20		173	24.62		214.59		60.29	
		4·49		2·37		0·08			4·39		0·32		0·65
129	219.51		160.07		77.12		174	20.23		214.91		59.64	
		4·48		2·30		0·09			4·38		0·29		0·66
130	+215.03		+162.37		+77.03		175	+ 15.85		+215.20		+58.98	
		−4·49		+2·25		−0·11			−4·39		+0·24		−0·67
131	210.54		164.62		76.92		176	11.46		215.44		58.31	
		4·48		2·18		0·12			4·38		0·21		0·68
132	206.06		166.80		76.80		177	7.08		215.65		57.63	
		4·48		2·12		0·14			4·39		0·17		0·68
133	201.58		168.92		76.66		178	+ 2 69		215.82		56.95	
		4·49		2·07		0·15			4·39		0·14		0·70
134	197.09		170.99		76.51		179	− 1.70		215.96		56.25	
		−4·48		+2·01		−0·17			−4·39		+0·10		−0·71
135	+192.61		+173.00		+76.34		180	− 6.09		+216.06		+55.54	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

Terms multiplied with t. Argument = M.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
180°	− 6.09		+216.06		+55.54		225°	−208.16		+178.25		+15.94	
		−4·39		+0·06		−0·72			−4·62		−1·95		−1·00
181	10.48		216.12		54.82		226	212.78		176.30		14.94	
		4·40		+0·03		0·72			4·62		2·01		1·00
182	14.88		216.15		54.10		227	217.40		174.29		13.94	
		4·39		−0·02		0·74			4·62		2·06		1·01
183	19.27		216.13		53.36		228	222.02		172.23		12.93	
		4·40		0·04		0·74			4·62		2·12		1·01
184	23.67		216.09		52.62		229	226.64		170.11		11.92	
		4·40		0·09		0·76			4·63		2·19		1·01
185	28.07		216.00		51.86		230	231.27		167.92		10.91	
		4·41		0·12		0·76			4·63		2·24		1·01
186	32.48		215.88		51.10		231	235.90		165.68		9.90	
		4·40		0·16		0·77			4·63		2·31		1·02
187	36.88		215.72		50.33		232	240.53		163.37		8.88	
		4·41		0·20		0·78			4·63		2·38		1·02
188	41.29		215.52		49.55		233	245.16		160.99		7.86	
		4·42		0·23		0·78			4·63		2·46		1·02
189	45.71		215.29		48.77		234	249.79		158.55		6.84	
		4·42		0·27		0·80			4·63		2·51		1·02
190	− 50.13		+215.02		+47.97		235	−254.42		+156.04		+ 5.82	
		−4·42		−0·31		−0·80			−4·63		−2·58		−1·02
191	54.55		214.71		47.17		236	259.05		153.46		4.80	
		4·42		0·34		0·81			4·62		2·66		1·02
192	58.97		214.37		46.36		237	263.67		150.80		3.78	
		4·43		0·38		0·82			4·63		2·72		1·02
193	63.40		213.99		45.54		238	268.30		148.08		2.76	
		4·44		0·42		0·83			4·62		2·80		1·03
194	67.84		213.57		44.71		239	272.92		145.28		1.73	
		4·44		0·46		0 84			4·62		2·88		1·02
195	72.28		213.11		43.87		240	277.54		142.40		+ 0.71	
		4·44		0·50		0·84			4·62		2·96		1·02
196	76.72		212.61		43.03		241	282.16		139.44		− 0.31	
		4·45		0·54		0·85			4·61		3 04		1·03
197	81.17		212.07		42.18		242	286.77		136.40		1.34	
		4·46		0·58		0·86			4·60		3·12		1·02
198	85.63		211.49		41.32		243	291.37		133.28		2.36	
		4·46		0·62		0·86			4·59		3·20		1·03
199	90.09		210.87		40.46		244	295.96		130.08		3.39	
		4·46		0·67		0·87			4·59		3·28		1·02
200	− 94.55		+210.20		+39.59		245	−300.55		+126.80		− 4.41	
		−4·47		−0·70		−0·88			−4·58		−3·36		−1 02
201	99.02		209.50		38.71		246	305.13		123.44		5.43	
		4·48		0·75		0·89			4·57		3·45		1·02
202	103.50		208.75		37.82		247	309.70		119.99		6.45	
		4·48		0·80		0·89			4·55		3·54		1·02
203	107.98		207.95		36.93		248	314.25		116.45		7.47	
		4·49		0·85		0·90			4·54		3 62		1·02
204	112.47		207.10		36.03		249	318.79		112.83		8.49	
		4·50		0·89		0·90			4·53		3·71		1 02
205	116.97		206.21		35.13		250	323.32		109.12		9.51	
		4·50		0·93		0·91			4·51		3 80		1·01
206	121.47		205.28		34.22		251	327.83		105.32		10.52	
		4·51		0·98		0·92			4·50		3·89		1·01
207	125.98		204.30		33.30		252	332.33		101.43		11.53	
		4·51		1·02		0·92			4·48		3·98		1·01
208	130.49		203.28		32.38		253	336.81		97.45		12.54	
		4·52		1·08		0·93			4·46		4·07		1·01
209	135.01		202.20		31.45		254	341.27		93.38		13.55	
		4·53		1·12		0·93			4·44		4·16		1·00
210	−139.54		+201.08		+30.52		255	−345.71		+ 89.22		−14.55	
		−4·53		−1·17		−0·94			−4·41		−4·26		−1·00
211	144.07		199.91		29.58		256	350.12		84.96		15.55	
		4·54		1·21		0·95			4·39		4·36		0·99
212	148.61		198.70		28.63		257	354.51		80.60		16.54	
		4·55		1·27		0·95			4·37		4·46		1·00
213	153.16		197.43		27.68		258	358.88		76.14		17.54	
		4·55		1·31		0·95			4·33		4·56		0·98
214	157.71		196.12		26.73		259	363.21		71.58		18.52	
		4·56		1·37		0·96			4·30		4·66		0·99
215	162.27		194.75		25.77		260	367.51		66.92		19.51	
		4·56		1·41		0·96			4·28		4·76		0·98
216	166.83		193.34		24.81		261	371.79		62.16		20.49	
		4·58		1·47		0·97			4·24		4·87		0·97
217	171.41		191.87		23.84		262	376.03		57.29		21.46	
		4·57		1·52		0·97			4·20		4·97		0·97
218	175.98		190.35		22.87		263	380.23		52.32		22.43	
		4·58		1·56		0·98			4·16		5·08		0·96
219	180.56		188.79		21.89		264	384.39		47.24		23.39	
		4·59		1·63		0·98			4·12		5·19		0·96
220	−185.15		+187.16		+20.91		265	−388.51		+ 42.05		−24.35	
		−4·59		−1·67		−0·99			−4·08		−5·30		−0·95
221	189.74		185.49		19.92		266	392.59		36.75		25.30	
		4·60		1·73		0·99			4·03		5·41		0·94
222	194.34		183.76		18.93		267	396.62		31.34		26.24	
		4·60		1·78		0·99			3·98		5·52		0·94
223	198.94		181.98		17.94		268	400.60		25.82		27.18	
		4·61		1·84		1·00			3·93		5·64		0·93
224	203.55		180.14		16.94		269	404.53		20.18		28.11	
		−4·61		−1·89		−1·00			−3·87		−5·75		−0·92
225	−208.16		+178.25		+15.94		270	−408.40		+ 14.43		−29.03	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

Terms multiplied with t. Argument = M.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
270°	−408.40		+ 14.43		−29.03		315°	−457.24		−365.32		−56.92	
		−3·81		− 5·87		−0·92			+ 3·59		−10·46		−0·17
271	412.21		8.56		29.95		316	453.65		375.78		57.09	
		3·76		5·99		0·91			3·90		10·48		0·14
272	415.97		+ 2.57		30.86		317	449.75		386.26		57.23	
		3·68		6·11		0·90			4·18		10·49		0·12
273	419.65		− 3.54		31.76		318	445.57		396.75		57.35	
		3·62		6·23		0·89			4·50		10·47		0 09
274	423.27		9.77		32.65		319	441.07		407.22		57.44	
		3·55		6·34		0·88			4·81		10·45		0·06
275	426.82		16.11		33.53		320	436.26		417.67		57.50	
		3·47		6·47		0·87			5·11		10·42		0·04
276	430.29		22.58		34.40		321	431.15		428.09		57.54	
		3·39		6·60		0·86			5·44		10·39		−0·01
277	433.68		29.18		35.26		322	425.71		438.48		57.55	
		3·31		6·71		0·86			5·76		10·34		+0·02
278	436.99		35.89		36.12		323	419.95		448.82		57.53	
		3·22		6·84		0·84			6·08		10·29		0·05
279	440.21		42.73		36.96		324	413.87		459.11		57.48	
		3·13		6·96		0·83			6·41		10·23		0·08
280	−443.34		− 49.69		−37.79		325	−407.46		−469.34		−57.40	
		−3·04		− 7·09		−0·82			+ 6·74		−10·14		+0·11
281	446.38		56.78		38.61		326	400.72		479.48		57.29	
		2·94		7·21		0·80			7·06		10·05		0·14
282	449.32		63.99		39.41		327	393.66		489.53		57.15	
		2·83		7·34		0·80			7·40		9·95		0·17
283	452.15		71.33		40.21		328	386.26		499.48		56.98	
		2·72		7·47		0·78			7·73		9·82		0·20
284	454.87		78.80		40.99		329	378.53		509.30		56.78	
		2·62		7·59		0·77			8·05		9·70		0·23
285	457.49		86.39		41.76		330	370.48		519.00		56.55	
		2·49		7·71		0·76			8·38		9·54		0·26
286	459.98		94.10		42.52		331	362.10		528.54		56.29	
		2·38		7·84		0·74			8·71		9·37		0·29
287	462.36		101.94		43.26		332	353.39		537.91		56.00	
		2·24		7·96		0·73			9·03		9·21		0·32
288	464.60		109.90		43.99		333	344.36		547.12		55.68	
		2·12		8·09		0·72			9·35		9·02		0·35
289	466.72		117.99		44.71		334	335.01		556.14		55.33	
		1·98		8·21		0·70			9·67		8·81		0·38
290	−468.70		−126.20		−45.41		335	−325.34		−564.95		−54.95	
		−1·84		− 8·33		−0·69			+ 9·99		− 8·61		+0·41
291	470.54		134.53		46.10		336	315.35		573.56		54.54	
		1·69		8·45		0·67			10·32		8 37		0·44
292	472.23		142.98		46.77		337	305.03		581.93		54.10	
		1·53		8·57		0·65			10·61		8·13		0·48
293	473.76		151.55		47.42		338	294.42		590.06		53.62	
		1·38		8·69		0·64			10·91		7·89		0·50
294	475.14		160.24		48.06		339	283.51		597.95		53.12	
		1·22		8·81		0·62			11·21		7·61		0·54
295	476.36		169.05		48.68		340	272.30		605.56		52.58	
		1·04		8·92		0·61			11·48		7·33		0·57
296	477.40		177.97		49.29		341	260.82		612.89		52.01	
		0·87		9·04		0·58			11·75		7·04		0·59
297	478.27		187.01		49.87		342	249.07		619.93		51.42	
		0·69		9·15		0·57			12·01		6·73		0·63
298	478.96		196.16		50.44		343	237.06		626.66		50.79	
		0·50		9·26		0·55			12·25		6·40		0·66
299	479.46		205.42		50.99		344	224.81		633.06		50.13	
		0·32		9·36		0·53			12·50		6·08		0·69
300	−479.78		−214.78		−51.52		345	−212.31		−639.14		−49.44	
		−0·12		− 9·47		−0·51			+12·72		− 5·74		+0·72
301	479.90		224.25		52.03		346	199.59		644.88		48.72	
		+0·09		9·57		0·49			12·94		5·38		0·75
302	479.81		233.82		52.52		347	186.65		650.26		47.97	
		0·29		9·66		0·47			13·15		5·02		0·78
303	479.52		243.48		52.99		348	173.50		655.28		47.19	
		0·52		9·76		0·45			13·35		4·63		0·80
304	479.00		253.24		53.44		349	160.15		659.91		46.39	
		0·73		9·85		0·43			13·51		4·25		0·84
305	478.27		263.09		53.87		350	146.64		664.16		45.55	
		0·97		9·93		0·41			13·69		3·86		0·86
306	477.30		273.02		54.28		351	132.95		668.02		44.69	
		1·20		10·00		0·39			13·84		3·46		0·90
307	476.10		283.02		54.67		352	119.11		671.48		43.79	
		1·45		10·08		0·36			13·95		3·05		0·92
308	474.65		293.10		55.03		353	105.16		674.53		42.87	
		1·69		10·16		0·34			14·08		2·65		0·94
309	472.96		303.26		55.37		354	91.08		677.18		41.93	
		1·95		10·22		0·32			14·17		2·24		0·98
310	−471.01		−313.48		−55.69		355	− 76.91		−679.42		−40.95	
		+2·22		−10·27		−0·30			+14·24		− 1·82		+1·00
311	468.79		323.75		55.99		356	62.67		681.24		39.95	
		2·47		10·33		0·27			14·31		1·39		1·02
312	466.32		334.08		56.26		357	48.36		682.63		38.93	
		2·75		10·38		0·24			14·35		0·97		1·05
313	463.57		344.46		56.50		358	34.01		683.60		37.88	
		3·02		10·42		0·22			14·38		0·52		1·07
314	460.55		354.88		56.72		359	19.63		684.12		36.81	
		+3·31		−10·44		−0·20			+13·39		− 0·10		+1·10
315	−457.24		−365.32		−56.92		360	− 5.24		−684.22		−35.71	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT I.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
°							°						
0	−577		+177		+21		45	+ 303		+928		+37	
		+ 7		+24		0			+36		+ 5		+1
1	570		201		21		46	339		933		38	
		8		24		0			36		3		0
2	562		225		21		47	375		936		38	
		8		23		+1			37		2		1
3	554		248		22		48	412		938		39	
		9		23		0			38		+ 2		1
4	545		271		22		49	450		940		40	
		9		23		0			38		− 1		1
5	536		294		22		50	488		939		41	
		10		22		0			39		1		0
6	526		316		22		51	527		938		41	
		11		22		1			40		3		1
7	515		338		23		52	567		935		42	
		11		22		0			40		5		1
8	504		360		23		53	607		930		43	
		11		21		0			41		5		1
9	493		381		23		54	648		925		44	
		12		21		0			41		8		1
10	−481		+402		+23		55	+ 689		+917		+45	
		+13		+21		+1			+42		− 9		+1
11	468		423		24		56	731		908		46	
		13		21		0			42		10		0
12	455		444		24		57	773		898		46	
		14		20		0			42		13		1
13	441		464		24		58	815		885		47	
		14		20		0			42		14		1
14	427		484		24		59	857		871		48	
		14		19		0			43		15		1
15	413		503		24		60	900		856		49	
		15		19		1			42		18		1
16	398		522		25		61	942		838		50	
		15		20		0			43		19		0
17	383		542		25		62	985		819		50	
		16		18		0			42		21		1
18	367		560		25		63	1027		798		51	
		17		19		0			42		23		0
19	350		579		25		64	1069		775		51	
		17		18		1			42		25		1
20	−333		+597		+26		65	+1111		+750		+52	
		+17		+18		+0			+42		−27		+0
21	316		615		26		66	1153		723		52	
		18		18		0			41		28		1
22	298		633		26		67	1194		695		53	
		19		17		0			40		30		0
23	279		650		26		68	1234		665		53	
		19		17		1			40		33		+1
24	260		667		27		69	1274		632		54	
		19		17		0			40		34		0
25	241		684		27		70	1314		598		54	
		21		17		0			38		35		0
26	220		701		27		71	1352		563		54	
		20		16		1			38		38		0
27	200		717		28		72	1390		525		54	
		22		16		0			37		40		0
28	178		733		28		73	1427		485		54	
		22		16		0			36		41		0
29	156		749		28		74	1463		444		54	
		23		15		1			35		43		−1
30	−133		+764		+29		75	+1498		+401		+53	
		+24		+15		+0			+34		−45		−0
31	109		779		29		76	1532		356		53	
		24		14		0			32		46		0
32	85		793		29		77	1564		310		53	
		25		14		1			31		48		1
33	60		807		30		78	1595		262		52	
		26		14		0			30		50		1
34	34		821		30		79	1625		212		51	
		26		13		1			28		51		0
35	− 8		834		31		80	1653		161		51	
		28		13		0			27		53		1
36	+ 20		847		31		81	1680		108		50	
		28		12		1			25		54		1
37	48		859		32		82	1705		+ 54		49	
		29		11		0			24		56		2
38	77		870		32		83	1729		− 2		47	
		30		11		1			22		57		1
39	107		881		33		84	1751		59		46	
		30		10		0			20		59		1
40	+137		+891		+33		85	+1771		−118		+45	
		+32		+ 9		+1			+18		−60		−2
41	169		900		34		86	1789		178		43	
		32		8		1			16		61		2
42	201		908		35		87	1805		239		41	
		33		8		0			14		62		1
43	234		916		35		88	1819		301		40	
		34		7		1			12		64		2
44	268		923		36		89	1831		365		38	
		+35		+ 5		+1			+10		−64		−2
45	+303		+928		+37		90	+1841		−429		+36	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT I.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
90°	+1841		− 429		+ 36		135°	− 408		−2839′		−116	
91	1848	+ 7	495	−66	34	−2	136	506	−98	2840	− 1	119	−3
92	1854	6	561	66	31	3	137	605	99	2837	+ 3	122	3
93	1857	+ 3	628	67	29	2	138	704	99	2831	6	125	3
94	1857	0	696	68	27	2	139	803	99	2820	11	127	2
95	1856	− 1	765	69	24	3	140	902	99	2806	14	130	3
96	1851	5	834	69	21	3	141	1001	99	2788	18	132	2
97	1844	7	904	70	18	3	142	1100	99	2767	21	134	2
98	1835	9	975	71	15	3	143	1198	98	2741	26	136	2
99	1823	12	1045	70	12	3	144	1295	97	2712	29	138	2
		15		71		3			96		33		2
100	+1808		−1116		+ 9		145	−1391		−2679		−140	
101	1791	−17	1187	−71	6	−3	146	1487	−96	2642	+ 37	141	−1
102	1771	20	1259	72	+ 3	3	147	1581	94	2602	40	143	2
103	1748	23	1330	71	0	3	148	1674	93	2558	44	144	1
104	1722	26	1401	71	− 4	4	149	1766	92	2510	48	145	1
105	1693	29	1471	70	7	3	150	1856	90	2459	51	146	1
106	1661	32	1542	71	11	4	151	1944	88	2405	54	147	1
107	1626	35	1612	70	14	3	152	2030	86	2347	58	148	1
108	1589	37	1681	69	18	4	153	2114	84	2286	61	148	0
109	1548	41	1749	68	22	4	154	2196	82	2221	65	149	−1
		44		68		3			80		67		0
110	+1504		−1817		− 25		155	−2276		−2154		−149	
111	1458	−46	1883	−66	29	−4	156	2354	−78	2083	+ 71	149	0
112	1409	49	1949	66	33	4	157	2429	75	2009	74	149	0
113	1356	53	2013	64	37	4	158	2501	72	1933	76	148	+1
114	1301	55	2075	62	41	4	159	2571	70	1854	79	148	0
115	1243	58	2136	61	45	4	160	2637	66	1772	82	147	1
116	1182	61	2196	60	48	3	161	2701	64	1688	84	146	1
117	1118	64	2253	57	52	4	162	2762	61	1601	87	145	1
118	1052	66	2309	56	56	4	163	2819	57	1512	89	144	1
119	983	69	2363	54	60	4	164	2874	55	1420	92	143	1
		72		51		4			51		93		2
120	+ 911		−2414		− 64		165	−2925		−1327		−141	
121	837	−74	2463	−49	68	−4	166	2973	−48	1232	+ 95	140	+1
122	760	77	2509	46	72	4	167	3017	44	1135	97	138	2
123	681	79	2553	44	75	3	168	3058	41	1036	99	136	2
124	600	81	2595	42	79	4	169	3095	37	935	101	134	2
125	516	84	2633	38	83	4	170	3128	33	833	102	132	2
126	431	85	2668	35	86	3	171	3158	30	730	103	129	3
127	344	87	2701	33	90	4	172	3184	26	626	104	127	2
128	255	89	2730	29	94	4	173	3206	22	521	105	124	3
129	164	91	2756	26	97	3	174	3224	18	414	107	121	3
		93		22		3			15		107		3
130	+ 71		−2778		−100		175	−3239		− 307		−118	
131	− 22	−93	2797	−19	104	−4	176	3249	−10	200	+107	115	+3
132	117	95	2813	16	107	3	177	3255	6	− 92	108	112	3
133	213	96	2825	12	110	3	178	3258	− 3	+ 17	109	109	3
134	310	97	2834	9	113	3	179	3256	+ 2	125	108	105	4
135	− 408	−98	−2839	− 5	−116	−3	180	−3251	+ 5	+ 234	+109	−102	+3

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT I.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
180°	−3251		+ 234		−102		225°	+ 122		+2878		+78	
		+ 10		+108		+4			+98		−21		+2
181	3241	13	342	108	98	4	226	220	96	2857	25	80	2
182	3228	18	450	108	94	3	227	316	95	2832	28	82	2
183	3210	22	558	106	91	4	228	411	94	2804	31	84	2
184	3188	25	664	107	87	4	229	505	91	2773	35	86	2
185	3163	30	771	105	83	4	230	596	90	2738	38	88	2
186	3133	34	876	104	79	4	231	686	88	2700	41	90	2
187	3099	37	980	103	75	5	232	774	85	2659	44	92	2
188	3062	42	1083	101	70	4	233	859	83	2615	47	93	1
189	3020	45	1184	100	66	4	234	942	81	2568	50	94	1
190	−2975		+1284		− 62		235	+1023		+2518		+95	
		+ 49		+ 98		+5			+78		−52		+1
191	2926	52	1382	96	57	4	236	1101	76	2466	55	96	1
192	2874	57	1478	94	53	4	237	1177	73	2411	57	97	1
193	2817	59	1572	94	49	4	238	1250	70	2354	60	98	1
194	2758	63	1664	92	44	5	239	1320	68	2294	61	98	0
195	2695	67	1754	90	40	4	240	1388	65	2233	64	98	0
196	2628	70	1841	87	35	5	241	1453	61	2169	66	98	0
197	2558	73	1926	85	31	4	242	1514	59	2103	67	99	+1
198	2485	75	2008	82	26	5	243	1573	56	2036	69	98	−1
199	2410	79	2087	79	22	4	244	1629	53	1967	71	98	0
200	−2331		+2163		− 17		245	+1682		+1896		+98	
		+ 82		+ 73		+4			+50		−72		−1
201	2249	84	2236	70	13	5	246	1732	46	1824	73	97	0
202	2165	86	2306	66	8	4	247	1778	44	1751	76	97	1
203	2079	89	2372	63	− 4	5	248	1822	40	1676	75	96	1
204	1990	91	2435	60	+ 1	4	249	1862	37	1601	77	95	1
205	1899	93	2495	56	5	5	250	1899	34	1524	77	94	1
206	1806	95	2551	52	10	4	251	1933	30	1447	78	93	1
207	1711	97	2603	48	14	4	252	1963	27	1369	78	92	2
208	1614	98	2651	45	18	5	253	1990	25	1291	78	90	1
209	1516	99	2696	41	23	4	254	2015	20	1212	78	89	2
210	−1417		+2737		+ 27		255	+2035		+1134		+87	
		+101		+ 37		+4			+18		−79		−1
211	1316	102	2774	33	31	4	256	2053	14	1055	79	86	2
212	1214	102	2807	29	35	4	257	2067	12	976	79	84	2
213	1112	104	2836	25	39	4	258	2079	8	897	79	82	2
214	1008	103	2861	21	43	3	259	2087	6	818	78	80	2
215	905	104	2882	18	46	4	260	2093	+ 2	740	77	78	2
216	801	104	2900	13	50	4	261	2095	− 1	663	77	76	2
217	697	104	2913	9	54	3	262	2094	4	586	77	74	2
218	593	104	2922	5	57	3	263	2090	7	509	76	72	2
219	489	104	2927	+ 2	60	3	264	2083	9	434	74	70	2
220	− 385		+2929		+ 63		265	+2074		+ 360		+68	
		+103		− 3		+4			−13		−74		−2
221	282	102	2926	6	67	3	266	2061	15	286	72	66	3
222	180	102	2920	10	70	2	267	2046	17	214	71	63	2
223	− 78	102	2910	14	72	3	268	2029	21	143	69	61	2
224	+ 22	100	2896	18	75	3	269	2008	23	74	68	59	3
225	+ 122	+100	+2878	− 18	+ 78	+3	270	+1985	−23	+ 6	−68	+56	−3

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT I.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
270°	+1985		+ 6		+56		315°	− 20		−962		−10	
		−25		−67		−2			−35		+18		+1
271	1960		− 61		54		316	55		944		9	
		27		65		3			34		19		0
272	1933		126		51		317	89		925		9	
		30		63		2			33		20		1
273	1903		189		49		318	122		905		8	
		32		61		3			32		21		0
274	1871		250		46		319	154		884		8	
		34		59		2			31		21		1
275	1837		309		44		320	185		863		7	
		35		58		2			30		22		1
276	1802		367		42		321	215		841		6	
		38		55		3			28		23		0
277	1764		422		39		322	243		818		6	
		39		53		2			27		23		1
278	1725		475		37		323	270		795		5	
		41		52		3			26		24		1
279	1684		527		34		324	296		771		4	
		43		49		2			25		24		1
280	+1641		− 576		+32		325	−321		−747		− 3	
		−44		−47		−2			−24		+25		+1
281	1597		623		30		326	345		722		2	
		45		45		3			23		25		1
282	1552		668		27		327	368		697		1	
		47		42		2			22		26		0
283	1505		710		25		328	390		671		− 1	
		47		40		2			20		26		1
284	1458		750		23		329	410		645		0	
		49		38		2			20		26		1
285	1409		788		21		330	430		619		+ 1	
		49		36		3			18		26		1
286	1360		824		18		331	448		593		2	
		50		33		2			17		27		1
287	1310		857		16		332	465		566		3	
		51		31		2			16		27		1
288	1259		888		14		333	481		539		4	
		51		28		2			16		27		1
289	1208		916		12		334	497		512		5	
		52		26		2			14		27		1
290	+1156		− 942		+10		335	−511		−485		+ 6	
		−52		−24		−2			−13		+27		+1
291	1104		966		8		336	524		458		7	
		52		22		1			12		27		1
292	1052		988		7		337	536		431		8	
		53		20		2			12		28		0
293	999		1008		5		338	548		403		8	
		52		17		2			10		27		1
294	947		1025		3		339	558		376		9	
		52		15		1			9		28		1
295	895		1040		+ 2		340	567		348		10	
		52		13		2			9		27		1
296	843		1053		0		341	576		321		11	
		52		11		1			7		28		1
297	791		1064		− 1		342	583		293		12	
		51		8		1			7		27		0
298	740		1072		2		343	590		266		12	
		51		7		2			5		27		1
299	689		1079		4		344	595		239		13	
		51		5		1			5		28		1
300	+ 638		−1084		− 5		345	−600		−211		+14	
		−50		− 3		−1			− 4		+27		+0
301	588		1087		6		346	604		184		14	
		49		− 1		1			3		27		1
302	539		1088		7		347	607		157		15	
		49		+ 1		0			2		27		1
303	490		1087		7		348	609		130		16	
		47		2		1			− 2		27		0
304	443		1085		8		349	611		103		16	
		47		4		1			0		26		1
305	396		1081		9		350	611		77		17	
		46		6		0			0		27		0
306	350		1075		9		351	611		50		17	
		46		7		−1			+ 1		26		1
307	304		1068		10		352	610		− 24		18	
		44		9		0			1		26		0
308	260		1059		10		353	609		+ 2		18	
		43		10		0			3		26		1
309	217		1049		10		354	606		28		19	
		42		12		0			3		25		0
310	+ 175		−1037		−10		355	−603		+ 53		+19	
		−41		+13		0			+ 4		+26		+0
311	134		1024		10		356	599		79		19	
		40		14		0			4		25		1
312	94		1010		10		357	595		104		20	
		39		15		0			5		25		0
313	55		995		10		358	590		129		20	
		38		16		0			6		24		0
314	+ 17		979		10		359	584		153		20	
		−37		+17		0			+ 7		+24		+1
315	− 20		− 962		−10		360	−577		+177		+21	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT II.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
°							°						
0	+551		+ 51		−38		45	+ 118		+727		−23	
		− 1		+14		+1			−26		+12		−0
1	550		65		37		46	92		739		23	
		2		13		0			26		11		0
2	548		78		37		47	66		750		23	
		1		13		1			27		10		1
3	547		91		36		48	39		760		24	
		1		14		1			27		9		0
4	546		105		35		49	+ 12		769		24	
		2		13		1			29		8		0
5	544		118		34		50	− 17		777		24	
		2		14		0			29		8		0
6	542		134		34		51	46		785		24	
		2		14		1			30		6		1
7	540		146		33		52	76		791		25	
		2		14		1			30		6		0
8	538		160		32		53	106		797		25	
		2		14		1			31		5		0
9	536		174		31		54	137		802		25	
		2		14		0			32		3		1
10	+534		+188		−31		55	− 169		+805		−26	
		− 3		+14		+1			−32		+ 3		−0
11	531		202		30		56	201		808		26	
		3		15		1			32		+ 2		0
12	528		217		29		57	233		810		26	
		3		14		1			33		0		1
13	525		231		28		58	266		810		27	
		4		15		0			33		− 1		0
14	521		246		28		59	299		809		27	
		4		15		1			34		2		0
15	517		261		27		60	333		807		27	
		4		15		0			34		3		0
16	513		276		27		61	367		804		27	
		5		16		1			34		5		0
17	508		292		26		62	401		799		27	
		5		15		1			34		6		−1
18	503		307		25		63	435		793		28	
		5		16		0			35		7		0
19	498		323		25		64	470		786		28	
		6		16		1			34		8		0
20	+492		+339		−24		65	− 504		+778		−28	
		− 7		+16		+0			−34		−10		0
21	485		355		24		66	538		768		28	
		7		16		0			35		12		0
22	478		371		24		67	573		756		28	
		8		16		1			34		12		0
23	470		387		23		68	607		744		28	
		8		17		0			34		14		0
24	462		404		23		69	641		730		28	
		9		16		1			33		16		0
25	453		420		22		70	674		714		28	
		9		17		0			34		17		0
26	444		437		22		71	708		697		28	
		10		16		0			32		18		0
27	434		453		22		72	740		679		28	
		11		17		0			33		19		+1
28	423		470		22		73	773		660		27	
		12		17		0			32		20		0
29	411		487		22		74	805		638		27	
		12		16		+1			31		22		0
30	+399		+503		−21		75	− 836		+616		−27	
		−13		+17		0			−30		−24		+1
31	386		520		21		76	866		592		26	
		14		16		0			30		25		0
32	372		536		21		77	896		567		26	
		14		17		0			29		27		0
33	358		553		21		78	925		540		26	
		16		16		0			28		28		1
34	342		569		21		79	953		512		25	
		16		16		0			27		29		1
35	326		585		21		80	980		483		24	
		17		16		0			26		30		0
36	309		601		21		81	1006		453		24	
		18		16		0			25		32		1
37	291		617		21		82	1031		421		23	
		18		15		0			24		33		1
38	273		632		21		83	1055		388		22	
		20		15		0			22		34		0
39	253		647		21		84	1077		354		22	
		20		14		−1			21		35		1
40	+233		+661		−22		85	−1098		+319		−21	
		−22		+15		0			−20		−37		+1
41	211		676		22		86	1118		282		20	
		22		13		0			19		37		1
42	189		689		22		87	1137		245		19	
		23		14		0			17		39		1
43	166		703		22		88	1154		206		18	
		24		12		0			16		39		1
44	142		715		22		89	1170		167		17	
		−24		+12		−1			−14		−40		+2
45	+118		+727		−23		90	−1184		+127		−15	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT II.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
90°	−1184		+ 127		−15		135°	+ 5		−1420		+ 76	
		−12		−41		+1			+56		− 4		+1
91	1196	11	86	42	14	1	136	61	56	1424	− 1	77	2
92	1207	9	44	43	13	2	137	117	57	1425	+ 1	79	2
93	1216	7	+ 1	43	11	1	138	174	56	1424	3	81	2
94	1223	5	− 42	43	10	1	139	230	56	1421	5	83	2
95	1228	4	85	45	9	2	140	286	56	1416	8	85	1
96	1232	− 2	130	44	7	2	141	342	56	1408	9	86	2
97	1234	0	174	45	5	1	142	398	55	1399	12	88	1
98	1234	+ 2	219	46	4	2	143	453	56	1387	13	89	2
99	1232	4	265	45	− 2	2	144	509	54	1374	16	91	1
100	−1228	+ 6	− 310	−46	0	+1	145	+ 563	+54	−1358	+18	+ 92	+1
101	1222	8	356	45	+ 1	2	146	617	53	1340	20	93	1
102	1214	10	401	46	3	2	147	670	53	1320	22	94	2
103	1204	11	447	45	5	2	148	723	51	1298	24	96	1
104	1193	14	492	46	7	2	149	774	51	1274	26	97	1
105	1179	16	538	45	9	2	150	825	50	1248	27	98	1
106	1163	17	583	44	11	2	151	875	48	1221	30	99	1
107	1146	20	627	44	13	2	152	923	48	1191	32	99	0
108	1126	22	671	44	15	2	153	971	46	1159	33	100	1
109	1104	23	715	43	17	3	154	1017	44	1126	35	101	1
110	−1081	+25	− 758	−42	+20	+2	155	+1061	+44	−1091	+37	+101	+1
111	1056	28	800	42	22	2	156	1105	42	1054	38	102	0
112	1028	29	842	40	24	2	157	1147	40	1016	40	102	0
113	999	31	882	40	26	3	158	1187	38	976	42	102	0
114	968	32	922	39	29	2	159	1225	37	934	43	102	+1
115	936	35	961	38	31	2	160	1262	35	891	44	103	0
116	901	36	999	36	33	2	161	1297	33	847	46	103	−1
117	865	38	1035	35	35	3	162	1330	32	801	46	102	0
118	827	39	1070	34	38	2	163	1362	29	755	48	102	0
119	788	41	1104	33	40	2	164	1391	28	707	50	102	0
120	− 747	+42	−1137	−31	+42	+3	165	+1419	+26	− 657	+50	+102	−1
121	705	44	1168	29	45	2	166	1445	23	607	51	101	0
122	661	45	1197	28	47	2	167	1468	21	556	52	101	1
123	616	47	1225	27	49	3	168	1489	20	504	52	100	1
124	569	47	1252	25	52	2	169	1509	17	452	54	99	1
125	522	49	1277	23	54	2	170	1526	15	398	54	99	0
126	473	50	1300	21	56	3	171	1541	13	344	54	98	1
127	423	51	1321	19	59	2	172	1554	10	290	55	97	1
128	372	52	1340	17	61	2	173	1564	9	235	56	96	1
129	320	53	1357	16	63	2	174	1573	6	179	55	95	2
130	− 267	+53	−1373	−13	+65	+2	175	+1579	+ 3	− 124	+56	+ 93	−1
131	214	54	1386	12	67	2	176	1582	+ 2	68	56	92	1
132	160	55	1398	10	69	3	177	1584	− 1	− 12	56	91	1
133	105	55	1408	7	72	2	178	1583	3	+ 44	56	90	2
134	− 50	+55	1415	+ 5	74	+2	179	1580	− 5	100	+56	88	−1
135	+ 5		−1420		+76		180	+1575		+ 156		+ 87	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT II.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
180°	+1575		+ 156		+87		225°	− 291		+1353		− 6	
181	1567	− 8	211	+55	85	−2	226	342	−51	1337	−16	8	−2
182	1557	10	266	55	83	2	227	393	51	1318	19	10	2
183	1545	12	321	55	82	1	228	443	50	1298	20	11	1
184	1531	14	375	54	80	2	229	492	49	1276	22	12	1
185	1514	17	428	53	78	2	230	539	47	1252	24	14	2
186	1496	18	481	53	76	2	231	586	47	1226	26	15	1
187	1475	21	533	52	74	2	232	631	45	1199	27	17	2
188	1452	23	584	51	72	2	233	675	44	1170	29	18	1
189	1427	25	635	51	70	2	234	717	42	1140	30	19	1
		27		49		2			41		32		1
190	+1400		+ 684		+68		235	− 758		+1108		−20	
191	1372	−28	732	+48	66	−2	236	798	−40	1075	−33	21	−1
192	1341	31	779	47	64	2	237	836	38	1040	35	22	1
193	1308	33	825	46	62	2	238	872	36	1004	36	23	1
194	1274	34	870	45	60	2	239	907	35	967	37	24	1
195	1238	36	913	43	57	3	240	940	33	929	38	25	1
196	1200	38	955	42	55	2	241	971	31	890	39	26	1
197	1160	40	995	40	53	2	242	1001	30	850	40	27	1
198	1119	41	1033	38	51	2	243	1028	27	809	41	27	0
199	1076	43	1071	38	48	3	244	1054	26	767	42	28	1
		44		35		2			24		43		1
200	+1032		+1106		+46		245	−1078		+ 724		−29	
201	987	−45	1140	+34	44	−2	246	1100	−22	681	−43	29	−0
202	941	46	1172	32	41	3	247	1120	20	637	44	30	1
203	893	48	1202	30	39	2	248	1138	18	593	44	30	0
204	844	49	1230	28	37	2	249	1154	16	548	45	31	1
205	794	50	1256	26	34	3	250	1168	14	503	45	31	0
206	743	51	1281	25	32	2	251	1181	13	458	45	32	1
207	691	52	1303	22	30	2	252	1191	10	412	46	32	0
208	639	52	1324	21	28	2	253	1199	8	367	45	32	0
209	585	54	1342	18	25	3	254	1205	6	321	46	33	1
		54		16		2			5		45		0
210	+ 531		+1358		+23		255	−1210		+ 276		−33	
211	477	−54	1373	+15	21	−2	256	1212	− 2	230	−46	33	−0
212	422	55	1385	12	19	2	257	1213	− 1	185	45	33	0
213	367	55	1395	10	17	2	258	1211	+ 2	141	44	33	0
214	311	56	1403	8	15	2	259	1208	3	96	45	34	1
215	256	55	1409	6	12	3	260	1203	5	52	44	34	0
216	200	56	1413	4	10	2	261	1196	7	+ 9	43	34	0
217	144	56	1414	+ 1	8	2	262	1187	9	− 34	43	34	0
218	89	55	1414	0	6	2	263	1177	10	76	42	34	0
219	+ 33	56	1412	− 2	4	2	264	1165	12	118	42	34	0
		55		5		1			14		40		0
220	− 22		+1407		+ 3		265	−1151		− 158		−34	
221	77	−55	1400	− 7	+ 1	−2	266	1136	+15	198	−40	34	−0
222	131	54	1391	9	− 1	2	267	1119	17	237	39	34	0
223	185	54	1381	10	3	2	268	1101	18	274	37	34	0
224	238	53	1368	13	5	2	269	1081	20	311	37	34	0
225	− 291	−53	+1353	−15	− 6	−1	270	−1060	+21	− 347	−36	−34	−0

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT II.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
270°	−1060		−347		−34		315°	+385		−647		−46	
		+23		−35		−0			+20		+16		−0
271	1037		382		34		316	305		631		46	
		24		33		0			19		16		0
272	1013		415		34		317	324		615		46	
		25		32		0			18		16		1
273	988		447		34		318	342		599		47	
		26		31		0			17		16		0
274	962		478		34		319	359		583		47	
		27		30		0			16		17		1
275	935		508		34		320	375		566		48	
		28		28		0			16		17		0
276	907		536		34		321	391		549		48	
		29		28		0			14		17		0
277	878		564		34		322	405		532		48	
		30		26		0			14		17		1
278	848		590		34		323	419		575		49	
		30		24		0			13		17		0
279	818		614		34		324	432		498		49	
		32		23		0			13		17		0
280	− 786		−637		−34		325	+444		−481		−49	
		+33		−21		−0			+11		+18		−0
281	754		658		34		326	455		463		49	
		32		20		0			11		17		−1
282	722		678		34		327	466		446		50	
		33		19		0			10		17		0
283	689		697		34		328	476		429		50	
		34		17		0			9		17		0
284	655		714		34		329	485		412		50	
		34		16		1			8		18		0
285	621		730		35		330	493		394		50	
		34		14		0			8		17		0
286	587		744		35		331	501		377		50	
		35		13		0			7		17		0
287	552		757		35		332	508		360		50	
		35		12		0			6		17		0
288	517		769		35		333	514		343		50	
		34		10		0			6		16		0
289	483		779		35		334	520		327		50	
		35		9		1			5		17		0
290	− 448		−788		−36		335	+525		−310		−50	
		+35		− 7		−0			+ 5		+16		0
291	413		795		36		336	530		294		50	
		35		6		0			4		17		0
292	378		801		36		337	534		277		50	
		34		5		0			4		16		0
293	344		806		36		338	538		261		50	
		35		4		1			3		16		0
294	309		810		37		339	541		245		50	
		34		2		0			3		15		+1
295	275		812		37		340	544		230		49	
		34		− 1		0			3		16		0
296	241		813		37		341	547		214		49	
		33		0		1			2		15		0
297	208		813		38		342	549		199		49	
		33		+ 2		0			2		15		0
298	175		811		38		343	551		184		49	
		32		2		0			1		15		1
299	143		809		38		344	552		169		48	
		32		4		1			1		15		0
300	− 111		−805		−39		345	+553		−154		−48	
		+32		+ 5		−0			+ 1		+14		+1
301	79		800		39		346	554		140		47	
		31		5		1			1		15		0
302	48		795		40		347	555		125		47	
		30		7		0			+ 1		14		1
303	− 18		788		40		348	556		111		46	
		30		8		0			0		14		0
304	+ 12		780		40		349	556		97		46	
		29		8		1			0		14		1
305	41		772		41		350	556		83		45	
		28		10		0			0		14		0
306	69		762		41		351	556		69		45	
		27		10		1			0		13		1
307	96		752		42		352	556		56		44	
		27		11		0			0		14		1
308	123		741		42		353	556		42		43	
		25		12		1			− 1		13		0
309	148		729		43		354	555		29		43	
		25		12		0			0		14		1
310	+ 173		−717		−43		355	+555		− 15		−42	
		+24		+13		−1			− 1		+13		+1
311	197		704		44		356	554		− 2		41	
		24		14		0			1		13		1
312	221		690		44		357	553		+ 11		40	
		22		14		1			0		14		0
313	243		676		45		358	553		25		40	
		22		14		0			1		13		1
314	265		662		45		359	552		38		39	
		+20		+15		−1			− 1		+13		+1
315	+ 285		−647		−46		360	+551		+ 51		−38	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT III.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
°							°						
0	+977		−196		+15		45	+537		−829		− 7	
		− 4		−17					−15		−9		
1	973		213			−2	46	522		838			−2
		4		17					16		9		
2	969		230				47	506		847			
		4		17	13				15		9	9	
3	965		247				48	491		856			
		5		17					16		9		
4	960		264			1	49	475		865			
		5		17					15		8		1
5	955		281				50	460		873			
		5		17	12				16		8	10	
6	950		298				51	444		881			
		5		16					16		8		
7	945		314			1	52	428		889			
		6		17					16		7		2
8	939		331				53	412		896			
		6		16	11				17		7	12	
9	933		347				54	395		903			
		6		17					16		7		
10	+927		−364			2	55	+379		−910			1
		− 7		−16					−16		−7		
11	920		380				56	363		917			
		7		16	9				17		6	13	
12	913		396				57	346		923			
		7		16					17		6		
13	906		412			1	58	329		929			
		8		16					17		6		1
14	898		428				59	312		935			
		8		16	8				16		6	14	
15	890		444				60	296		941			
		8		15					17		5		
16	882		459			2	61	279		946			
		8		16					18		5		2
17	874		475				62	261		951			
		9		15	6				17		4	16	
18	865		490				63	244		955			
		9		15					17		5		
19	856		505			1	64	227		960			
		9		15					17		4		1
20	+847		−520				65	+210		−964			
		− 9		−15	5				−18		−3	17	
21	838		535				66	192		967			
		10		15					17		4		
22	828		550			2	67	175		971			
		10		14					17		3		1
23	818		564				68	158		974			
		10		14	3				18		3	18	
24	808		578				69	140		977			
		11		14					17		2		
25	797		592			1	70	123		979			
		11		14					18		2		1
26	786		606				71	105		981			
		11		14	+ 2				18		2	19	
27	775		620				72	87		983			
		11		13					17		2		
28	764		633			2	73	70		985			
		12		14					18		1		1
29	752		647				74	52		986			
		12		13					17		1		
30	+740		−660		0		75	+ 35		−987		20	
		−12		−13					−18		−1		
31	728		673				76	+ 17		988			
		12		12		1			18		−1		1
32	716		685				77	− 1		989			
		13		13	− 1				17		0	21	
33	703		698				78	18		989			
		12		12					18		0		
34	691		710				79	36		989			
		13		12		2			17		+1		1
35	678		722				80	53		988			
		13		12	3				18		1	22	
36	665		734				81	71		987			
		14		11					17		1		
37	651		745			1	82	88		986			
		13		11					18		1		1
38	638		756				83	106		985			
		14		12	4				17		2	23	
39	624		768				84	123		983			
		14		11					18		2		
40	+610		−779			2	85	−141		−981			1
		−15		−10					−17		+2		
41	595		789				86	158		979			
		14		11	6				17		2	24	
42	581		800				87	175		977			
		14		10					17		3		
43	567		810			−1	88	192		974			
		15		10					17		3		−1
44	552		820				89	209		971			
		−15		− 9	− 7				−17		+4	−25	
45	+537		−829				90	−226		−967			

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT III.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
90°	−226		−967		−25		135°	−834		−548		−27	
		−17		+ 3					−8		+14		
91	243		964			−1	136	842		534			+0
		17		4					8		15		
92	260		960		26		137	850		519		27	
		17		4					8		14		
93	277		956				138	858		505			
		17		5					8		15		
94	294		951			0	139	866		490			1
		16		5					8		15		
95	310		946				140	874		475			
		17		5	26				7		15	26	
96	327		941				141	881		460			
		16		5					7		15		
97	343		936			1	142	888		445			0
		16		6					6		15		
98	359		930				143	894		430			
		16		6	27				7		15	26	
99	375		924				144	901		415			
		16		6					6		16		
100	−391		−918			0	145	−907		−399			1
		−16		+ 7					−6		+15		
101	407		911				146	913		384			
		16		6	27				5		16	25	
102	423		905				147	918		368			
		15		7					6		16		
103	438		898			−1	148	924		352			0
		16		8					5		16		
104	454		890				149	929		336			
		15		7	28				4		16	25	
105	469		883				150	933		320			
		15		8					5		16		
106	484		875			0	151	938		304			1
		15		8					4		16		
107	499		767				152	942		288			
		14		8	28				4		16	24	
108	513		859				153	946		272			
		15		9					4		17		
109	528		850			0	154	950		255			1
		14		9					3		16		
110	−542		−841				155	−953		−239			
		−15		+ 9	28				−3		+17	23	
111	557		832				156	956		222			
		14		9					3		16		
112	571		823			0	157	959		206			1
		13		10					2		17		
113	584		813				158	961		189			
		14		10	28				2		17	22	
114	598		803				159	963		172			
		13		10					2		17		
115	611		793			0	160	965		155			1
		14		10					2		16		
116	625		783				161	967		139			
		13		11	28				1		17	21	
117	638		772				162	968		122			
		13		10					1		17		
118	651		762			0	163	969		105			1
		12		11					−1		17		
119	663		751				164	970		88			
		13		11					0		17		
120	−676		−740		28		165	−970		− 71		20	
		−12		+12					0		+17		
121	688		728				166	970		54			
		12		11		0	167	970		37			1
122	700		717						0		17		
		11		12			168	970		20		19	
123	711		705		28				0		17		
		12		12			169	969	+1	− 3			
124	723		693								17		
		11		12		0	170	968	1	+ 14			1
125	734		681								17		
		11		13	28		171	967	1	31		18	
126	745		668								17		
		11		13			172	965	2	48			
127	756		655			0					17		1
		11		12			173	964	1	65			
128	767		643								17		
		10		13	28		174	962	2	82		17	
129	777		630								17		
		10		14					3				
130	−787		−616			0	175	−959	+2	+ 99	+17		2
		−10		+13									
131	797		603				176	957	3	116	17		
		9		13	28							15	
132	806		590				177	954	4	133	17		
		10		14									
133	816		576			+1	178	950	3	150	16		+1
		9		14									
134	825		562				179	947	+4	166	+17		
		− 9		+14									
135	−834		−548		−27		180	−943		+183		−14	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT III.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
180°	−943		+183		−14		225°	−524		+816		+ 7	
		+ 4		+17					+14		+10		
181	939		200			+1	226	510		826			+1
		4		17					14		9		
182	935		217		13		227	496		835		8	
		5		16					14		9		
183	930		233				228	482		844			
		5		17					15		9		
184	925		250			1	229	467		853			2
		5		16					14		9		
185	920		266				230	453		862			
		5		17	12				15		9	10	
186	915		283				231	438		871			
		6		16					15		8		
187	909		299			2	232	423		879			1
		6		16					14		8		
188	903		315				233	409		887			
		6		16	10				15		8	11	
189	897		331				234	394		895			
		6		16					16		7		
190	−891		+347			1	235	−378		+902			1
		+ 7		+16					+15		+ 7		
191	884		363				236	363		909			
		7		16	9				15		7	12	
192	877		379				237	348		916			
		7		16					16		7		
193	870		395			1	238	332		923			2
		7		16					15		6		
194	863		411				239	317		929			
		8		15	8				16		6	14	
195	855		426				240	301		935			
		8		16					16		6		
196	847		442			2	241	285		941			1
		8		15					16		6		
197	839		457				242	269		947			
		8		15	6				16		5	15	
198	831		472				243	253		952			
		9		15					16		5		
199	822		487			1	244	237		957			1
		9		15					16		4		
200	−813		+502				245	−221		+961			
		+ 9		+15	5				+16		+ 5	16	
201	804		517				246	205		966			
		9		14					16		4		
202	795		531			2	247	189		970			1
		10		15					16		4		
203	785		546				248	173		974			
		9		14	3				17		3	17	
204	776		560				249	156		977			
		10		14					16		3		
205	766		574			1	250	140		980			2
		11		14					17		3		
206	755		588				251	123		983			
		10		14	− 2				16		3	19	
207	745		602				252	107		986			
		11		13					17		2		
208	734		615			2	253	90		988			1
		10		14					16		2		
209	724		629				254	74		990			
		11		13					17		2		
210	−713		+642		0		255	− 57		+992		20	
		+12		+13					+17		+ 1		
211	701		655				256	40		993			
		11		13		1	257	24		994			1
212	690		668						16		1		
		12		13			258	− 7		995		21	
213	678		681		+ 1				17		1		
		12		12			259	+ 10		995	0		
214	666		693			2			17				
		12		12			260	26		995	0		1
215	654		705						16				
		12		12	3		261	43		995	0	22	
216	642		717						17				
		12		12			262	60		995	0		
217	630		729			1			17				
		13		12			263	77		994	− 1		1
218	617		741						16		1		
		13		11	4		264	93		993		23	
219	604		752						17		2		
		13		11									
220	−591		+763			1	265	+110		+991			1
		+13		+11					+17		− 1		
221	578		774				266	127		990			
		13		11	5		267	143		988	2	24	
222	565		785						16				
		14		11			268	160		985	3		
223	551		796			+2			17				+0
		13		10			269	177		983	2		
224	538		806						+16		− 3		
		+14		+10	+ 7		270	+193		+980		+24	
225	−524		+816										

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT III.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
270°	+193		+980		+24		315°	+821		+561		+28	
		+17		− 3					+ 9		−14		
271	210		977			+1	316	830		547			−0
		16		4					10		14		
272	226		973		25		317	840		533		28	
		16		4					9		15		
273	242		969				318	849		518			
		17		4					9		16		
274	259		965			1	319	858		502			
		16		4					9		16		1
275	275		961				320	867		486			
		16		5	26				8		15	27	
276	291		956				321	875		471			
		16		5					8		16		
277	307		951			0	322	883		455			
		17		5					8		16		0
278	324		946				323	891		439			
		16		6	26				8		16	27	
279	340		940				324	899		423			
		15		6					7		16		
280	+355		+934				325	+906		+407			
		+16		− 6		1			+ 7		−16		1
281	371		928				326	913		391			
		16		7	27				7		16	26	
282	387		921				327	920		375			
		16		6					7		16		
283	403		915			0	328	927		359			
		15		7					6		17		1
284	418		908				329	933		342			
		15		8	27				6		17	25	
285	433		900				330	939		325			
		16		7					6		16		
286	449		893			1	331	945		309			
		15		8					5		17		1
287	464		885				332	950		292			
		15		9	28				5		17	24	
288	479		876				333	955		275			
		15		8					5		17		
289	494		868			0	334	960		258			
		15		9					4		17		0
290	+509		+859				335	+964		+241			
		+14		− 9	28				+ 5		−17	24	
291	523		850				336	969		224			
		5		9					4		18		
292	538		841			0	337	973		206			
		14		10					3		17		1
293	552		831				338	976		189			
		14		9	28				3		17	23	
294	566		822				339	979		172			
		14		10					3		18		
295	580		812				340	982		154			
		14		11		+1	341	985	3	137	17		1
296	594		801										
		14		10	29		342	987	2	120	17	22	
297	608		791										
		13		11			343	989	2	102	18		
298	621		780			0							
		14		11			344	991	2	84	18		1
299	635		769										
		13		12					2		17		
300	+648		+757		29		345	+993		+ 67		21	
		+13		−11					+ 1		−18		
301	661		746				346	994		49			
		12		12		0			+ 1		17		1
302	673		734				347	995		32			
		13		12	29				0		18	20	
303	686		722				348	995		+ 14			
		12		12					0		18		
304	698		710				349	995		− 4			
		13		13		0							
305	711		697				350	995	0	21	17		1
		12		12									
306	723		685		29		351	995	0	39	18	19	
		11		13									
307	734		672				352	994	− 1	56	17		
		12		13		−1							
308	746		659				353	993	1	74	18		2
		11		14	28								
309	757		645				354	992	1	91	17	17	
		11		13					2		18		
310	+768		+632				355	+990		−109			
		+11		−14		0			− 2		−17		1
311	779		618				356	988		126			
		11		14	28				3		18		
312	790		604				357	985		144		16	
		11		14					2		17		
313	801		590			0	358	983		161			−1
		10		14					3		17		
314	811		576				359	980		178			
		+10		−15					− 3		−18		
315	+821		+561		+28		360	+977		−196		+15	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT IV.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
°							°						
0	−775		+ 75		+38		45	−502		+691		+ 6	
		+ 2		+15					+10		+11		
1	773		90			−2	46	492		702			−4
		1		16					10		11		
2	772		106		36		47	482		713		+ 2	
		2		15					11		10		
3	770		121				48	471		723			
		2		16					11		11		
4	768		137				49	460		734			
		3		15		1			10		10		4
5	765		152				50	450		744			
		2		15					11		10		
6	763		167		35		51	439		754		− 2	
		3		15					12		9		
7	760		182				52	427		763			
		3		15		1			11		10		4
8	757		197				53	416		773			
		3		16					11		9		
9	754		213		34		54	405		782		6	
		4		15					12		9		
10	−750		+228				55	−393		+791			
		+ 3		+15		2			+11		+ 9		4
11	747		243				56	382		800			
		4		14					12		9		
12	743		257		32		57	370		809		10	
		4		15					12		8		
13	739		272				58	358		817			
		4		15		2			12		8		5
14	735		287				59	346		825			
		5		15					12		8		
15	730		302		30		60	334		833		15	
		5		14					12		8		
16	725		316				61	322		841			
		5		15		1			12		7		5
17	720		331				62	310		848			
		5		14					12		8		
18	715		345		29		63	298		856		20	
		5		14					13		7		
19	710		359				64	285		863			
		6		15		2			12		6		5
20	−704		+374				65	−273		+869			
		+ 5		+14					+13		+ 7		
21	699		388		27		66	260		876		25	
		6		14					12		6		
22	693		402				67	248		882			
		6		14		2			13		6		5
23	687		416				68	235		888			
		7		14					13		6		
24	680		430		25		69	222		894		30	
		6		13					13		5		
25	674		443				70	209		899			
		7		14		2			13		5		5
26	667		457				71	196		904			
		7		13					13		5		
27	660		470		23		72	183		909		35	
		7		14					13		5		
28	653		484				73	170		914			
		8		13		2			13		4		6
29	645		497				74	157		918			
		7		13					13		4		
30	−638		+510		21		75	−144		+922		41	
		+ 8		+13					+14		+ 4		
31	630		523				76	130		926			
		8		13		3			13		3		5
32	622		536				77	117		929			
		8		13					14		3		
33	614		549		18		78	103		932		46	
		9		13					13		3		
34	605		562				79	90		935			
		8		12		3			14		2		6
35	597		574				80	76		937			
		9		13					13		3		
36	588		587		15		81	63		940		52	
		9		12					14		2		
37	579		599				82	49		942			
		9		12		3			14		1		5
38	570		611				83	35		943			
		9		12					14		1		
39	561		623		12		84	21		944		57	
		9		12					13		1		
40	−552		+635				85	− 8		+945			
		+10		+11		3			+14		+ 1		6
41	542		646				86	+ 6		946			
		10		12					14		0		
42	532		658		9		87	20		946		63	
		9		11					14		0		
43	523		669				88	34		946			
		10		11		−3			14		0		−5
44	513		680				89	48		946			
		+11		+11					+14		− 1		
45	−502		+691		+ 6		90	+ 62		+945		−68	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT IV.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
90°	+ 62		+945		− 68		135°	+678		+605		−114	
91	77	+15	944	− 1			136	690	+12	591	−14		
92	91	14	943	1		−5	137	701	11	578	13		0
93	105	14	941	2	73		138	712	11	564	14	114	
94	119	14	939	2			139	723	11	550	14		
95	133	14	937	2		5	140	734	11	536	14		+1
96	147	14	935	2	78		141	745	11	522	14	113	
97	162	15	932	3			142	755	10	507	15		
98	176	14	929	3		5	143	765	10	493	14		1
99	190	14	925	4	83		144	775	10	478	15	112	
		14		4					9		15		
100	+204		+921				145	+784		+463			
101	219	+15	917	− 4		4	146	794	+10	448	−15		2
102	233	14	912	5	87		147	803	9	433	15	110	
103	247	14	908	4			148	812	9	418	15		
104	262	15	903	5		5	149	820	8	403	15		2
105	276	14	897	6	92		150	828	8	388	15	108	
106	290	14	891	6			151	836	8	372	16		
107	305	15	885	6		4	152	844	8	357	15		3
108	319	14	879	6	96		153	851	7	341	16	105	
109	333	14	872	7			154	858	7	325	16		
		14		7		3			7		16		3
110	+347		+865				155	+865		+309			
111	362	+15	858	− 7	99		156	872	+ 7	293	−16	102	
112	376	14	851	7			157	878	6	277	16		
113	390	14	843	8		4	158	884	6	261	16		3
114	404	14	835	8	103		159	889	5	245	16	99	
115	418	14	826	9			160	894	5	229	16		
116	432	14	817	9		3	161	899	5	213	16		4
117	446	14	808	9	106		162	904	5	197	16	95	
118	459	13	799	9			163	908	4	181	16		
119	473	14	790	9		2	164	912	4	164	17		4
		14		10					3		16		
120	+487		+780		108		165	+915		+148		91	
121	500	+13	770	−10			166	918	+ 3	132	−16		
122	514	14	760	10		2	167	921	3	115	17		5
123	527	13	749	11	110		168	923	2	99	16	86	
124	541	14	738	11			169	925	3	83	16		
125	554	13	727	11		2	170	927	2	67	16		5
126	567	13	716	11	112		171	928	1	50	17	81	
127	580	13	704	12			172	929	+ 1	34	16		
128	593	13	693	11		1	173	929	0	18	16		5
129	605	12	681	12	113		174	929	0	+ 1	17	76	
		13		12					0		16		
130	+618		+669				175	+929		− 15			
131	630	+12	656	−13		−1	176	928	− 1	31	−16		6
132	643	13	644	12	114		177	927	1	47	16	70	
133	655	12	631	13			178	926	1	63	16		
134	667	12	618	13		0	179	924	2	79	16		+6
135	+678	+11	+605	−13	−114		180	+922	− 2	− 95	−16	− 64	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT IV.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
180°	+922		− 95		−64		225°	+481		−700		+38	
		− 3		−16					−16		−10		
181	919		111			+6	226	465		710			+6
		3		16					15		9		
182	916		127				227	450		719			
		3		16	58				16		0	44	
183	913		143				228	434		729			
		4		15					15		9		
184	909		158			6	229	419		738			
		4		16					16		9		6
185	905		174				230	403		747			
		4		16	52				16		9	50	
186	901		190				231	387		756			
		5		15					16		8		
187	896		205			7	232	371		764			
		5		16					16		9		6
188	891		221				233	355		773			
		6		15	45				16		8	56	
189	885		236				234	339		781			
		6		15					16		8		
190	+879		−251			7	235	+323		−789			
		− 6		−15					−16		− 6		5
191	873		266				236	307		797			
		7		15	38				16		8	61	
192	866		281				237	291		805			
		7		15					17		7		
193	859		296			7	238	274		812			
		7		15					16		7		5
194	852		311				239	258		819			
		8		15	31				16		7	66	
195	844		326				240	242		826			
		8		14					16		7		
196	836		340			7	241	226		833			
		8		15					16		6		5
197	828		355				242	210		839			
		9		14	24				17		7	71	
198	819		369				243	193		846			
		9		14					16		6		
199	810		383			7	244	177		852			
		9		14					16		5		4
200	+801		−397				245	+161		−857			
		−10		−14	17				−16		− 6	75	
201	791		411				246	145		863			
		10		14					16		5		
202	781		425			7	247	129		868			
		10		13					16		5		4
203	771		438				248	113		873			
		11		14	10				16		5	79	
204	760		452				249	97		878			
		11		14					16		5		
205	749		466			7	250	81		883			
		11		13					16		4		
206	738		479				251	65		887			
		11		13	− 3				16		4	82	
207	727		492				252	49		891			
		12		13					15		4		
208	715		505			7	253	34		895			
		12		13					16		4		3
209	703		518				254	18		899			
		12		12					15		3		
210	+691		−530		+ 4		255	+ 3		−902		85	
		−13		−13					−16		− 3		
211	678		543				256	− 13		905			
		13		12		7			15		3		3
212	665		555				257	28		908			
		13		12	11				15		3	88	
213	652		567				258	43		911			
		13		12					15		2		
214	639		579			7	259	58		913			
		13		12					15		2		2
215	626		591				260	73		915			
		14		12	18				15		2	90	
216	612		603				261	88		917			
		14		11					14		2		
217	598		614			7	262	102		919			
		14		12					15		1		2
218	584		626				263	117		920			
		14		11	25				14		1	92	
219	570		637				264	131		921			
		15		11					14		− 1		
220	+555		−648			6	265	−145		−922			
		−14		−10					−15		0		1
221	541		658				266	160		922			
		15		11	31				14		0	93	
222	526		669				267	174		922			
		15		10					13		0		
223	511		679			+7	268	187		922			
		15		11					14		0		+1
224	496		690				269	201		922			
		−15		−10	+38				−13		+ 1		
225	+481		−700				270	−214		−921		+94	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT IV.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
270°	−214		−921		+94		315°	−652		−600		+71	
		−14		+ 1					−6		+13		
271	228		920			+1	316	658		587			−3
		13		1					6		13		
272	241		919				317	664		574			
		13		2	95				6		13	68	
273	254		917				318	670		561			
		13		2					6		13		
274	267		915			0	319	676		548			3
		12		2					5		13		
275	279		913				320	681		535			
		13		2	95				6		14	65	
276	292		911				321	687		521			
		12		3					5		14		
277	304		908			−1	322	692		507			3
		12		3					5		14		
278	316		905				323	697		493			
		12		3	94				5		14	62	
279	328		902				324	702		479			
		12		4					5		14		
280	−340		−898				325	−707		−465			
		−12		+ 4		0			−5		+15		2
281	352		894				326	712		450			
		11		4	94				4		14	60	
282	363		890				327	716		436			
		12		4					5		15		
283	375		886			1	328	721		421			3
		11		5					4		15		
284	386		881				329	725		406			
		11		5	93				4		14	57	
285	397		876				330	729		392			
		11		5					4		15		
286	408		871			1	331	733		377			2
		10		6					4		15		
287	418		865				332	737		362			
		11		6	92				4		15	55	
288	429		859				333	741		347			
		10		6					3		15		
289	439		853			2	334	744		332			3
		10		6					4		16		
290	−449		−847				335	−748		−316			
		−10		+ 7	90				−3		+15	52	
291	459		840				336	751		301			
		10		7					3		15		
292	469		833			2	337	754		286			2
		10		8					3		16		
293	479		825				338	757		270			
		9		7	88				3		15	50	
294	488		818				339	760		255			
		9		8					2		16		
295	497		810			2	340	762		239			2
		10		8					3		16		
296	507		802				341	765		223			
		9		9	86				2		15	48	
297	516		793				342	767		208			
		8		8					2		16		
298	524		785			2	343	769		192			2
		9		9					2		15		
299	533		776				344	771		177			
		9		9					2		16		
300	−542		−767		84		345	−773		−161		46	
		− 8		+10					−1		+16		
301	550		757			3	346	774		145			
		8		10					1		16		2
302	558		747				347	775		129			
		8		10	81				1		15	44	
303	566		737				348	776		114			
		8		10					1		16		
304	574		727			2	349	777		98			
		8		10					1		16		1
305	582		717				350	778		82			
		8		11	79				1		16	43	
306	590		706				351	779		66			
		7		11					−0		15		
307	597		695			3	352	779		51			
		7		11					0		16		2
308	604		684				353	779		35			
		8		11	76				0		16	41	
309	612		673				354	779		19			
		7		12					0		16		
310	−619		−661				355	−779		− 3			
		− 7		+12		3			0		+15		2
311	626		649				356	779		+ 12			
		6		12	73				+1		16	39	
312	632		637				357	778		28			
		7		12					1		16		
313	639		625			−2	358	777		44			−1
		6		12					1		15		
314	645		613				359	776		59			
		− 7		+13					+1		+16		
315	−652		−600		+71		360	−775		+ 75		+38	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT V.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
°							°						
0	−507		+ 52		− 84		135	+358		−188		+150	
		0		−13		+7			+18		+ 7		−2
3	507		39		77		138	376		181		148	
		+ 2		13		7			16		7		2
6	505		26		70		141	392		174		146	
		3		13		7			16		8		2
9	502		+ 13		63		144	408		166		144	
		5		13		7			14		8		3
12	497		0		56		147	422		158		141	
		6		13		7			14		8		4
15	491		− 13		49		150	436		150		137	
		7		13		8			12		9		4
18	484		26		41		153	448		141		133	
		9		13		8			11		9		4
21	475		39		33		156	459		132		129	
		10		13		8			10		10		4
24	465		52		25		159	469		122		125	
		11		12		7			8		9		5
27	454		64		18		162	477		113		120	
		13		13		8			7		10		5
30	−441		− 77		− 10		165	+484		−103		+115	
		+14		−12		+8			+ 6		+11		−6
33	427		89		− 2		168	490		92		109	
		15		11		8			4		10		6
36	412		100		+ 6		171	494		82		103	
		16		12		8			3		11		6
39	396		112		14		174	497		71		97	
		17		11		8			+ 2		10		6
42	379		123		22		177	499		61		91	
		19		10		8			0		11		7
45	360		133		30		180	499		50		84	
		20		10		8			− 1		11		6
48	340		143		38		183	498		39		78	
		20		10		7			2		11		7
51	320		153		45		186	496		28		71	
		21		10		8			3		12		8
54	299		163		53		189	493		16		63	
		22		8		7			5		11		7
57	277		171		60		192	488		− 5		56	
		23		8		8			6		11		8
60	−254		−179		+ 68		195	+482		+ 6		+ 48	
		+24		− 8		+7			− 8		+12		−7
63	230		187		75		198	474		18		41	
		24		7		7			9		11		8
66	206		194		82		201	465		29		33	
		25		7		6			10		11		8
69	181		201		88		204	455		40		25	
		25		6		7			11		11		8
72	156		207		95		207	444		51		17	
		26		5		6			12		12		8
75	130		212		101		210	432		63		9	
		26		4		6			14		11		8
78	104		216		107		213	418		74		+ 1	
		26		4		5			14		10		8
81	78		220		112		216	404		84		− 7	
		27		4		6			16		11		8
84	51		224		118		219	388		95		15	
		26		2		5			17		11		8
87	− 25		226		123		222	371		106		23	
		27		2		4			17		10		8
90	+ 2		−228		+127		225	+354		+116		− 31	
		+27		− 2		+4			−19		+10		−8
93	29		230		131		228	335		126		39	
		26		− 1		4			19		10		8
96	55		231		135		231	316		136		47	
		26		0		4			21		9		7
99	81		231		139		234	295		145		54	
		26		+ 1		3			21		9		7
102	107		230		142		237	274		154		61	
		26		1		3			22		9		8
105	133		229		145		240	252		163		69	
		26		1		2			22		9		7
108	159		228		147		243	230		172		76	
		25		2		2			23		8		7
111	184		226		149		246	207		180		83	
		24		3		2			24		7		6
114	208		223		151		249	183		187		89	
		24		4		1			25		7		7
117	232		219		152		252	158		194		96	
		23		4		+1			25		7		6
120	+255		−215		+153		255	+133		+201		−102	
		+22		+ 4		0			−25		+ 6		−5
123	277		211		153		258	108		207		107	
		21		5		0			25		6		6
126	298		206		153		261	83		213		113	
		21		6		−1			26		5		5
129	319		200		152		264	57		218		118	
		20		6		1			26		4		5
132	339		194		151		267	31		222		123	
		+19		+ 6		−1			−26		+ 4		−4
135	+358		−188		+150		270	+ 5		+226		−127	

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT V.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Diff.
270°	+ 5		+226		−127		315°	−351		+205		−149	
		−26		+3		−5			−19		− 6		+2
273	− 21		229		132		318	370		199		147	
		26		3		3			17		6		2
276	47		232		135		321	387		191		145	
		25		2		4			17		8		3
279	72		234		139		324	404		183		142	
		26		1		3			16		8		3
282	98		235		142		327	420		175		139	
		26		+1		3			14		9		3
285	124		236		145		330	434		166		136	
		25		0		2			13		10		4
288	149		236		147		333	447		156		132	
		25		−1		2			12		10		4
291	174		235		149		336	459		146		128	
		24		1		1			11		10		4
294	198		234		150		339	470		136		124	
		24		2		1			9		11		5
297	222		232		151		342	479		125		119	
		23		3		−1			8		12		5
300	−245		+229		−152		345	−487		+113		−114	
		−23		−3		0			− 7		−11		+5
303	268		226		152		348	494		102		109	
		22		4		0			5		12		6
306	290		222		152		351	499		90		103	
		21		5		+1			4		13		6
309	311		217		151		354	503		77		97	
		21		6		1			3		12		6
312	332		211		150		357	506		65		91	
		−19		−6		+1			− 1		−13		+7
315	−351		+205		−149		360	−507		+ 52		− 84	

ARGUMENT VI.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
0°	+492		+ 54		0	69	+127		+471		
		− 4		+25				−25		+ 6	
3	488		79			72	102		477		−4
		5		25	0			25		5	
6	483		104			75	77		482		
		6		25				26		3	
9	477		129			78	51		485		4
		7		24	−1			26		2	
12	470		153			81	+ 25		487		
		9		24				26		+ 1	
15	461		177			84	− 1		488		4
		10		23	1			26		− 1	
18	451		200			87	27		487		
		11		23				26		2	
21	440		223			90	53		485		5
		12		22	2			25		3	
24	428		245			93	78		482		
		14		21				26		5	
27	414		267			96	104		477		5
		14		21				25		6	
30	+400		+288		2	99	−129		+471		
		−16		+20				−25		− 7	
33	384		308			102	154		464		5
		17		19	2			25		9	
36	367		327			105	179		455		
		18		19				24		9	
39	349		346			108	203		446		4
		19		17	3			23		11	
42	330		363			111	226		435		
		19		16				23		13	
45	311		379			114	249		422		4
		21		16	3			22		13	
48	290		395			117	271		409		
		21		14				22		15	
51	269		409			120	293		394		4
		22		14	3			21		15	
54	247		423			123	314		379		
		23		13				19		17	
57	224		435			126	333		362		4
		23		11				19		18	
60	+201		+446		4	129	−352		−344		
		−24		+ 9				−18		−18	
63	177		455			132	370		326		4
		25		9	−4			17		20	
66	152		464			135	387		306		
		−25		+ 7				−16		−20	
69	+127		+471			138	−403		−286		−3

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT VI.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
138°	−403		+286		−3	249°	−125		−473		
141	418	−15	265	−21		252	100	+25	479	− 6	+4
145	431	13	243	22	3	255	74	26	483	4	
147	444	13	220	23		258	48	26	486	3	4
150	455	11	197	23	3	261	− 22	26	488	− 2	
153	465	10	173	24		264	+ 4	26	488	0	5
156	474	9	149	24	2	267	30	26	487	+ 1	
159	481	7	124	25		270	56	26	485	2	5
162	487	6	99	25	2	273	81	25	481	4	
165	492	5	74	25		276	107	26	476	5	5
		3		26				25		6	
168	−495		+ 48		1	279	+132		−470		
171	497	− 2	+ 23	−25		282	157	+25	462	+ 8	5
174	498	− 1	− 3	26	−1	285	181	24	453	9	
177	497	+ 1	29	26		288	205	24	443	10	5
180	495	2	54	25	0	291	228	23	432	11	
183	491	4	80	26		294	251	23	420	12	4
186	486	5	105	25	0	297	273	22	406	14	
189	480	6	130	25		300	294	21	391	15	4
192	472	8	155	25	+1	303	314	20	376	15	
195	464	8	179	24		306	334	20	359	17	4
		10		23				19		18	
198	−454		−202		1	309	+353		−341		
201	442	+12	225	−23		312	370	+17	323	+18	4
204	430	12	248	23	2	315	387	17	303	20	
207	416	14	270	22		318	402	15	283	20	3
210	401	15	291	21	2	321	417	15	262	21	
213	385	16	311	20		324	430	13	240	22	3
216	368	17	330	19	2	327	442	12	217	23	
219	349	19	349	19		330	453	11	194	23	3
222	330	19	366	17	3	333	463	10	171	23	
225	310	20	383	17		336	472	9	147	24	2
		20		16				7		25	
228	−290		−398		3	339	+479		−132		
231	268	+22	412	−14		342	485	+ 6	98	+24	2
234	246	22	426	14	4	345	489	4	73	25	
237	223	23	438	12		348	492	3	47	26	1
240	199	24	448	10	4	351	494	2	− 22	25	
243	175	24	458	10		354	495	+ 1	+ 3	25	+1
246	150	25	466	8	+4	357	494	− 1	29	26	
249	−125	+25	−473	− 7		360	+492	− 2	+ 54	+25	0

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT VII.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
°						°					
0	−231		− 4		−20	135	+292		−400		
		− 1		− 4				+30		+17	
3	232		8			138	322		383		+ 8
		1		5	21			28		19	
6	233		13			141	350		364		
		1		5				27		22	
9	234		18			144	377		342		10
		2		5	22			26		23	
12	236		23			147	403		319		
		2		6				23		26	
15	238		29			150	426		293		13
		2		6	23			22		27	
18	240		35			153	448		266		
		3		7				20		30	
21	243		42			156	468		236		15
		2		8	24			17		31	
24	245		50			159	485		205		
		3		8				15		32	
27	248		58			162	500		173		16
		2		9				13		33	
30	−250		− 67		24	165	+513		−140		
		− 3		−10				+ 9		+34	
33	253		77			168	522		106		18
		2		11				7		36	
36	255		88		24	171	529		70		
		1		11				4		35	
39	256		99			174	533		− 35		19
		− 2		13	23			+ 1		36	
42	258		112			177	534		+ 1		
		0		14				− 1		36	
45	258		126			180	533		37		20
		0		14	23			5		33	
48	258		140			183	528		72		
		0		15				7		35	
51	258		155			186	521		107		21
		+ 2		16	22			10		35	
54	256		171			189	511		142		
		3		16				13		33	
57	253		187			192	498		175		22
		4		17				16		32	
60	−249		−204		21	195	+482		+207		
		+ 5		−18				−18		+31	
63	244		222			198	464		238		22
		7		17	19			20		29	
66	237		239			201	444		267		
		8		18				22		27	
69	229		257			204	422		294		23
		9		18	18			24		26	
72	220		275			207	398		320		
		11		18				26		23	
75	209		293			210	372		343		23
		13		18	16			27		21	
78	196		311			213	345		364		
		14		17				29		19	
81	182		328			216	316		383		22
		16		17	14			30		17	
84	166		345			219	286		400		
		17		17				30		14	
87	149		362			222	256		414		22
		20		15				31		11	
90	−129		−377		12	225	+225		+425		
		+20		−14				−31		+ 9	
93	109		391			228	194		434		21
		23		13	9			32		7	
96	86		404			231	162		441		
		24		12				31		4	
99	62		416			234	131		445		20
		26		10	7			31		+ 2	
102	37		426			237	100		447		
		27		8				31		0	
105	− 10		434			240	69		447		19
		28		7	4			29		− 3	
108	+ 18		441			243	40		444		
		29		4				29		4	
111	47		445			246	+ 11		440		18
		29		− 3	− 2			28		7	
114	76		448			249	− 17		433		
		31		0				27		9	
117	107		448			252	44		424		17
		31		+ 2				25		10	
120	+138		−446		+ 1	255	− 69		+414		
		+31		+ 4				−24		−12	
123	169		442			258	93		402		15
		31		7	3			22		13	
126	200		435			261	115		389		
		31		9				21		14	
129	231		426			264	136		375		13
		31		12	+ 6			19		15	
132	262		414			267	155		360		
		+30		+14				−17		−16	
135	+292		−400			270	−172		+344		+11

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT VII.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
270°	−172		+344		+11	315°	−259		+100		
		−16		−17				+2		−12	
273	188		327			318	257		88		− 7
		14		18	9			2		10	
276	202		309			321	255		78		
		12		17				3		10	9
279	214		292			324	252		68		
		11		18	7			3		9	
282	225		274			327	249		59		
		9		18				2		8	
285	234		256			330	247		51		11
		8		18	5			3		8	
288	242		238			333	244		43		
		6		18				3		7	
291	248		220			336	241		36		13
		5		17				2		6	
294	253		203		+ 3	339	239		30		
		4		17				2		6	
297	257		186			342	237		24		15
		3		16				2		5	
300	−260		+170		0	345	−235		+ 19		
		− 1		−16				+2		− 5	
303	261		155			348	233		14		17
		− 1		15	− 2			1		5	
306	262		140			351	232		9		
		0		14				+1		4	
309	262		126			354	231		5		19
		+ 1		14				0		4	
312	261		112		− 4	357	231		+ 1		
		+ 2		−12				0		− 5	
315	−259		+100			360	−231		− 4		−20

ARGUMENT VIII.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
0°	−352		+ 22		−7	69	−106		+335		
		+ 2		+18				+18		+ 5	
3	350		40			72	88		340		+ 6
		3		18	6			18		4	
6	347		58			75	70		344		
		3		18				18		3	7
9	344		76			78	52		347		
		5		18	5			18		2	
12	339		94			81	34		349		
		5		18				19		1	
15	334		112			84	− 15		350		8
		6		17	4			18		+ 1	
18	328		129			87	+ 3		351		
		8		17				19		− 1	
21	320		146			90	22		350		9
		8		17				18		2	
24	312		163		3	93	40		348		
		9		16				18		2	
27	303		179			96	58		346		9
		9		15				18		4	
30	−294		+194		2	99	+ 76		+342		
		+11		+15				+18		− 4	
33	283		209			102	94		338		10
		11		15	−1			18		6	
36	272		224			105	112		332		
		12		14				17		6	10
39	260		238			108	129		326		
		13		13	0			17		7	
42	247		251			111	146		319		
		14		12				16		8	11
45	233		263			114	162		311		
		14		12	+2			16		9	
48	219		275			117	178		302		
		15		11				16		10	
51	204		286			120	194		292		11
		15		10				15		11	
54	189		296		3	123	209		281		
		16		10				15		11	
57	173		306			126	224		270		11
		16		8				14		12	
60	−157		+314		4	129	+238		+258		
		+17		+ 8				+13		−13	
63	140		322			132	251		245		11
		17		7				12		13	
66	123		329		+5	135	263		232		
		+17		+ 6				+12		−14	
69	−106		+335			138	+275		+218		+11

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT VIII.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
138°	+275		+218		+11	249°	+106		−335		− 6
		+11		−15				−17		− 5	
141	286		203			252	89		340		
		11		15	11			18		4	7
144	297		188			255	71		344		
		9		16				18		3	
147	306		172			258	53		347		
		9		16	11			19		2	8
150	315		156			261	34		349		
		7		17				18		1	
153	322		139			264	+ 16		350		
		7		17	10			19		− 1	
156	329		122			267	− 3		351		9
		6		17				18		+ 1	
159	335		105			270	21		350		
		5		18	9			18		1	
162	340		87			273	39		349		9
		4		18				19		3	
165	344		69			276	58		346		
		4		18				18		4	
168	+348		+ 51		9	279	− 76		−342		10
		+ 2		−18				−18		+ 4	
171	350		33			282	94		338		
		1		18	8			17		5	
174	351		+ 15			285	111		333		10
		+ 1		18				18		7	
177	352		− 3			288	129		326		
		− 1		19	7			17		7	
180	351		22			291	146		319		11
		2		18				16		8	
183	349		40			294	162		311		
		2		18	6			16		9	
186	347		58			297	178		302		11
		4		18				16		10	
189	343		76			300	194		292		
		4		18	5			15		10	
192	339		94			303	209		282		11
		5		18				15		11	
195	334		112			306	224		271		
		7		17				14		12	
198	+327		−129		4	309	−238		−259		11
		− 7		−17				−13		+13	
201	320		146			312	251		246		
		8		16	3			13		14	11
204	312		162			315	264		232		
		9		16				12		14	
207	303		178			318	276		218		
		9		16	2			11		15	11
210	294		194			321	287		203		
		11		15				10		15	
213	283		209			324	297		188		
		11		14	+ 1			9		15	11
216	272		223			327	306		173		
		12		14				9		17	
219	260		237			330	315		156		
		13		13	0			8		16	
222	247		250			333	323		140		10
		14		13				7		17	
225	233		263			336	330		123		
		14		12				6		18	
228	+219		−275		− 2	339	−336		−105		9
		−14		−11				− 5		+18	
231	205		296			342	341		87		
		16		10	3			4		17	
234	189		296			345	345		70		9
		16		9				3		19	
237	173		305			348	348		51		
		16		9	4			3		18	
240	157		314			351	351		33		8
		16		8				− 1		18	
243	141		322			354	352		− 15		
		17		7	− 5			0		19	
246	124		329			357	352		+ 4		+ 7
		−18		− 6				0		+18	
249	+106		−335			360	−352		+ 22		

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT IX.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
0°	+150		− 3		+22	180°	−305		+ 11		−24
		0		− 8				+ 3		+34	
5	150		11		20	185	302		45		21
		0		7				8		33	
10	150		18		18	190	294		78		19
		+ 1		8				12		32	
15	151		26		16	195	282		110		16
		1		8				15		30	
20	152		34		13	200	267		140		13
		+ 1		9				20		27	
25	153		43		11	205	247		167		10
		0		10				23		25	
30	153		53		8	210	225		192		7
		0		10				25		20	
35	153		63		6	215	200		212		4
		0		12				28		18	
40	153		75		+ 3	220	172		230		− 1
		− 1		12				28		13	
45	152		87		0	225	144		243		+ 2
		3		13				29		9	
50	+149		−100		− 2	230	−115		+252		+ 5
		− 3		−14				+29		+ 5	
55	146		114		5	235	86		257		8
		5		14				29		+ 2	
60	141		128		8	240	57		259		11
		7		15				28		− 2	
65	134		143		10	245	29		257		13
		8		15				26		5	
70	126		158		13	250	− 3		252		16
		10		15				25		8	
75	116		173		16	255	+ 22		244		18
		12		15				23		10	
80	104		188		18	260	45		234		21
		15		14				20		12	
85	89		202		20	265	65		222		23
		17		14				18		13	
90	72		216		23	270	83		209		25
		19		12				16		15	
95	53		228		25	275	99		194		26
		22		10				14		16	
100	+ 31		−238		−27	280	+113		+178		+28
		−24		− 8				+11		−15	
105	+ 7		246		28	285	124		163		29
		25		6				8		16	
110	− 18		252		30	290	132		147		30
		27		− 2				7		16	
115	45		255		31	295	139		131		31
		28		0				5		15	
120	73		255		32	300	144		116		31
		28		+ 4				4		14	
125	101		251		33	305	148		102		32
		29		8				2		13	
130	130		243		34	310	150		89		32
		29		11				+ 2		13	
135	159		232		34	315	152		76		32
		27		15				0		12	
140	186		217		34	320	152		64		31
		26		19				0		10	
145	212		198		34	325	152		54		31
		24		22				0		10	
150	−236		−176		−33	330	+152		+ 44		+30
		−21		+26				− 1		− 9	
155	257		150		32	335	151		35		29
		17		29				1		8	
160	274		121		31	340	150		27		28
		14		31				0		8	
165	288		90		29	345	150		19		27
		10		32				0		8	
170	298		58		28	350	150		11		25
		6		34				− 1		7	
175	304		− 24		26	355	149		+ 4		24
		− 1		+35				+ 1		− 7	
180	−305		+ 11		−24	360	+150		− 3		+22

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT X.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
°						°					
0	+187		− 10		+ 6	180	−178		+ 17		− 6
		− 1		−16				+ 3		+16	
5	186		26		5	185	175		33		5
		3		17				4		15	
10	183		43		4	190	171		48		4
		5		17				5		14	
15	178		60		3	195	166		62		3
		6		16				7		14	
20	172		76		3	200	159		76		2
		8		15				7		14	
25	164		91		2	205	152		90		2
		9		15				9		13	
30	155		106		+ 1	210	143		103		− 1
		10		14				9		12	
35	145		120		0	215	134		115		0
		12		13				11		11	
40	133		133		− 1	220	123		126		+ 1
		12		12				11		10	
45	121		145		2	225	112		136		2
		14		11				12		10	
50	+107		−156		− 3	230	−100		+146		+ 3
		−15		− 9				+13		+ 8	
55	92		165		4	235	87		154		4
		15		8				13		8	
60	77		173		5	240	74		162		5
		16		7				14		6	
65	61		180		6	245	60		168		6
		16		5				14		5	
70	45		185		7	250	46		173		6
		17		3				14		4	
75	28		188		7	255	32		177		7
		17		2				15		3	
80	+ 11		190		8	260	17		180		8
		17		− 1				15		1	
85	− 6		191		9	265	− 2		181		8
		17		+ 2				16		+ 1	
90	23		189		9	270	+ 14		182		9
		16		2				15		− 2	
95	39		187		10	275	29		180		9
		16		4				15		2	
100	− 55		−183		−10	280	+ 44		+178		+10
		−16		+ 6				+15		− 4	
105	71		177		10	285	59		174		10
		15		7				14		5	
110	86		170		11	290	73		169		11
		14		8				14		6	
115	100		162		11	295	87		163		11
		13		10				14		7	
120	113		152		11	300	101		156		11
		12		11				13		9	
125	125		141		11	305	114		147		11
		11		11				12		10	
130	136		130		11	310	126		137		11
		10		13				12		11	
135	146		117		11	315	138		126		11
		9		13				10		12	
140	155		104		10	320	148		114		11
		8		14				10		13	
145	163		90		10	325	158		101		10
		6		15				8		14	
150	−169		− 75		−10	330	+166		+ 87		+10
		− 5		+15				+ 7		−15	
155	174		60		9	335	173		72		9
		3		15				6		15	
160	177		45		9	340	179		57		9
		2		16				4		16	
165	179		29		8	345	183		41		8
		− 1		15				3		17	
170	180		− 14		7	350	186		24		8
		0		16				+ 1		17	
175	180		+ 2		7	355	187		+ 7		7
		+ 2		+15				0		−17	
180	−178		+ 17		− 6	360	+187		− 10		+ 6

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT XI.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
0°	+101		+ 11		− 3	180°	−144		+ 10		−30
		− 3		+19				0		− 2	
5	98		30		− 1	185	144		8		31
		6		18				0		2	
10	92		48		+ 1	190	144		6		31
		9		17				− 1		3	
15	83		65		2	195	145		+ 3		32
		11		14				0		3	
20	72		79		3	200	145		0		32
		14		13				0		3	
25	58		92		4	205	145		− 3		33
		15		10				− 1		3	
30	43		102		4	210	146		6		34
		16		8				0		4	
35	27		110		4	215	146		10		34
		16		6				0		4	
40	+ 11		116		4	220	146		14		35
		16		3				0		4	
45	− 5		119		3	225	146		18		36
		16		+ 1				+ 1		5	
50	− 21		+120		+ 2	230	−145		− 23		−36
		−15		− 1				+ 1		− 5	
55	36		119		+ 1	235	144		28		37
		15		2				2		6	
60	51		117		0	240	142		34		37
		13		3				2		7	
65	64		114		− 2	245	140		41		37
		12		4				3		6	
70	76		110		3	250	137		47		38
		11		5				4		7	
75	87		105		5	255	133		54		38
		10		6				5		7	
80	97		99		7	260	128		61		38
		9		6				6		8	
85	106		93		9	265	122		69		38
		7		7				7		7	
90	113		86		10	270	115		76		38
		7		6				9		7	
95	120		80		12	275	106		83		37
		5		7				9		7	
100	−125		+ 73		−14	280	− 97		− 90		−37
		− 5		− 6				+11		− 6	
105	130		67		15	285	86		96		36
		3		6				12		5	
110	133		61		17	290	74		101		35
		3		6				14		5	
115	136		55		18	295	60		106		34
		3		6				14		3	
120	139		49		19	300	46		109		32
		1		5				16		− 2	
125	140		44		21	305	30		111		30
		1		4				17		0	
130	141		40		22	310	− 13		111		28
		1		4				17		+ 3	
135	142		36		23	315	+ 4		108		26
		1		4				17		5	
140	143		32		24	320	21		103		24
		0		3				17		7	
145	143		29		25	325	38		96		21
		0		3				16		9	
150	−143		+ 26		−26	330	+ 54		− 87		−19
		− 0		− 3				+14		+12	
155	143		23		26	335	68		75		16
		0		3				12		15	
160	143		20		27	340	80		60		13
		0		2				10		16	
165	143		18		28	345	90		44		10
		0		3				7		18	
170	143		15		29	350	97		26		8
		− 1		2				+ 4		19	
175	144		13		29	355	101		− 7		5
		0		− 3				0		+18	
180	−144		+ 10		−30	360	+101		+ 11		− 3

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT XII.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
°						°					
0	− 97		− 6		−2	180	+122		+ 8		+2
		+ 1		− 7				− 2		+12	
5	96		13			185	120		20		
		1		8	2			3		11	2
10	95		21			190	117		31		
		1		7				3		11	
15	94		28			195	114		42		
		2		7	3			5		10	3
20	92		35			200	109		52		
		3		8				6		10	
25	89		43			205	103		62		
		3		7	3			7		9	3
30	86		50			210	96		71		
		4		7				8		8	
35	82		57			215	88		79		
		4		7	2			8		7	2
40	78		64			220	80		86		
		4		6				9		7	
45	74		70			225	71		93		
		6		7				10		5	
50	− 68		− 77		2	230	+ 61		+ 98		2
		+ 6		− 6				−10		+ 5	
55	62		83			235	51		103		
		6		5	2			10		3	2
60	56		88			240	41		106		
		7		5				10		3	
65	49		93			245	31		109		
		8		5	2			11		1	2
70	41		98			250	20		110		
		8		4				10		+ 1	
75	33		102			255	+ 10		111		
		9		3	1			10		− 1	1
80	24		105			260	0		110		
		9		3				10		1	
85	15		108			265	− 10		109		
		10		1	1			9		2	1
90	− 5		109			270	19		107		
		10		− 1				10		3	
95	+ 5		110			275	29		104		
		10		0				8		4	
100	+ 15		−110		−1	280	− 37		+100		+1
		+10		+ 1				− 8		− 4	
105	25		109			285	45		96		
		11		2	0			8		5	0
110	36		107			290	53		91		
		10		2				7		5	
115	46		105			295	60		86		
		10		4	0			6		6	0
120	56		101			300	66		80		
		10		5				6		6	
125	66		96			305	72		74		
		9		6	+1			5		7	−1
130	75		90			310	77		67		
		9		7				4		7	
135	84		83			315	81		60		
		8		8	1			4		7	1
140	92		75			320	85		53		
		7		9				3		7	
145	99		66			325	88		46		
		7		9				3		7	
150	+106		− 57		1	330	− 91		+ 39		1
		+ 5		+10				− 2		− 7	
155	111		47			335	93		32		
		4		10	2			2		8	2
160	115		37			340	95		24		
		4		11				1		7	
165	119		26			345	96		17		
		2		11	2			− 1		8	2
170	121		15			350	97		9		
		+ 1		12				0		7	
175	122		− 3			355	97		+ 2		
		0		+11	+2			0		− 8	
180	+122		+ 8			360	− 97		− 6		−2

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT XIII.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
0°	−83		0		− 6	180°	+83		+ 0		+ 6
		+1		−4				−1		+3	
5	82		− 4			185	82		3		
		2		3	4			2		4	
10	80		7			190	80		7		4
		2		4				2		3	
15	78		11			195	78		10		
		3		3	− 2			3		4	+ 2
20	75		14			200	75		14		
		3		3				4		3	
25	72		17			205	71		17		
		4		4	0			4		3	
30	68		21			210	67		20		0
		5		3				5		3	
35	63		24			215	62		23		
		5		2	+ 1			5		3	− 1
40	58		26			220	57		26		
		6		3				5		2	
45	52		29			225	52		28		
		6		2				6		3	
50	−46		−31		3	230	+46		+31		3
		+6		−2				−7		+2	
55	40		33			235	39		33		
		7		2	5			6		2	5
60	33		35			240	33		35		
		7		2				7		1	
65	26		37			245	26		36		
		7		1	7			7		2	7
70	19		38			250	19		38		
		7		1				7		1	
75	12		39			255	12		39		
		7		−1	8			7		+1	8
80	− 5		40			260	+ 5		40		
		8		0				8		0	
85	+ 3		40			265	− 3		40		
		7		0	9			7		0	9
90	10		40			270	10		40		
		7		0				7		0	
95	17		40			275	17		40		
		7		+1				7		0	
100	+24		−39		10	280	−24		+40		10
		+7		+0				−7		−1	
105	31		39			285	31		39		
		7		1	10			7		1	10
110	38		38			290	38		38		
		6		2				6		1	
115	44		36			295	44		37		
		6		2	11			6		2	11
120	50		34			300	50		35		
		6		2				6		2	
125	56		32			305	56		33		
		5		2	11			5		2	11
130	61		30			310	61		31		
		5		2				5		2	
135	66		28			315	66		29		
		4		3	10			4		3	10
140	70		25			320	70		26		
		4		2				4		3	
145	74		23			325	74		23		
		3		3				3		3	
150	+77		−20		9	330	−77		+20		9
		+3		+3				−3		−3	
155	80		17			335	80		17		
		2		4	8			2		3	8
160	82		13			340	82		14		
		1		3				1		4	
165	83		10			345	83		10		
		+1		3	7			−1		3	7
170	84		7			350	84		7		
		0		4				0		4	
175	84		− 3			355	84		+ 3		
		−1		+3	+ 6			+1		−3	− 6
180	+83		0			360	−83		0		

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT XIV.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
°						°					
0	+44		+ 3		+2	180	−54		− 2		−2
		+1		−4				0		+5	
5	45		− 1			185	54		+ 3		
		0		3	2			0		5	2
10	45		4			190	54		8		
		−1		3				+1		5	
15	44		7			195	53		13		
		0		4	1			2		5	1
20	44		11			200	51		18		
		1		3				2		5	
25	43		14			205	49		23		
		1		4	+1			2		4	−1
30	42		18			210	47		27		
		1		3				3		4	
35	41		21			215	44		31		
		2		3	0			4		4	0
40	39		24			220	40		35		
		2		4				3		3	
45	37		28			225	37		38		
		2		3				4		3	
50	+35		−31		−1	230	−33		+41		+1
		−3		−3				+4		+3	
55	32		34			235	29		44		
		2		3	1			5		2	1
60	30		37			240	24		46		
		3		3				4		1	
65	27		40			245	20		47		
		4		2	2			5		1	2
70	23		42			250	15		48		
		3		2				4		1	
75	20		44			255	11		49		
		4		2	2			5		+1	2
80	16		46			260	6		50		
		4		2				4		−1	
85	12		48			265	− 2		49		
		4		1	3			4		0	3
90	8		49			270	+ 2		49		
		5		1				5		1	
95	+ 3		50			275	7		48		
		4		−1				4		1	
100	− 1		−51		3	280	+11		+47		3
		−5		0				+3		−2	
105	6		51			285	14		45		
		5		0	3			4		1	3
110	11		51			290	18		44		
		4		+1				4		2	
115	15		50			295	22		42		
		5		1	3			3		3	3
120	20		49			300	25		39		
		5		2				3		2	
125	25		47			305	28		37		
		4		2	4			2		3	4
130	29		45			310	30		34		
		4		3				3		3	
135	33		42			315	33		31		
		4		3	3			2		3	3
140	37		39			320	35		28		
		4		4				2		3	
145	41		35			325	37		25		
		3		4				2		3	
150	−44		−31		3	330	+39		+22		3
		−3		+4				+1		−3	
155	47		27			335	40		19		
		3		4	3			2		3	3
160	50		23			340	42		16		
		2		5				1		3	
165	52		18			345	43		13		
		1		5	3			0		3	3
170	53		13			350	43		10		
		−1		5				+1		4	
175	54		8			355	44		6		
		0		+6	−2			0		−3	+2
180	−54		− 2			360	+44		+ 3		

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT XV.

Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
°						°					
0	−29		− 2		0	180	+31		+ 2		0
5	29	0	4	−2	0	185	31	0	5	+3	0
10	29	0	7	3	0	190	30	−1	7	2	0
15	28	+1	9	2	0	195	29	1	10	3	0
20	27	1	12	3	0	200	28	1	13	3	0
25	26	1	14	2	0	205	27	1	15	2	0
30	25	1	16	2	0	210	25	2	17	2	0
35	23	2	18	2	0	215	24	1	20	3	0
40	22	1	20	2	0	220	22	2	22	2	0
45	20	2	22	2	0	225	20	2	23	1	0
		2		2				2		2	
50	−18	+2	−24	−1	0	230	+18	−3	+25	+1	0
55	16	2	25	1	0	235	15	2	26	2	0
60	14	3	26	1	0	240	13	3	28	1	0
65	11	2	27	1	0	245	10	2	29	0	0
70	9	2	28	1	0	250	8	3	29	+1	0
75	7	3	29	1	0	255	5	3	30	0	0
80	4	3	30	−1	0	260	+ 2	2	30	0	0
85	− 1	2	30	0	0	265	0	3	30	0	0
90	+ 1	3	30	0	0	270	− 3	2	30	0	0
95	4	2	30	0	0	275	5	3	30	−1	0
100	+ 6	+3	−30	+1	0	280	− 8	−2	+29	−1	0
105	9	3	29	1	0	285	10	3	28	1	0
110	12	2	28	1	0	290	13	2	27	1	0
115	14	2	27	1	0	295	15	2	26	2	0
120	16	3	26	2	0	300	17	2	24	1	0
125	19	2	24	1	0	305	19	2	23	2	0
130	21	2	23	2	0	310	21	2	21	2	0
135	23	2	21	2	0	315	23	1	19	2	0
140	25	1	19	3	0	320	24	1	17	2	0
145	26	2	16	2	0	325	25	2	15	2	0
150	+28	+1	−14	+3	0	330	−27	−1	+13	−3	0
155	29	1	11	2	0	335	28	0	10	2	0
160	30	0	9	3	0	340	28	−1	8	2	0
165	30	+1	6	3	0	345	29	0	6	3	0
170	31	0	3	2	0	350	29	0	3	2	0
175	31	0	− 1	+3	0	355	29	0	+ 1	−3	0
180	+31		+ 2		0	360	−29		− 2		0

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT XVI.						ARGUMENT XVII.					
Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
°						°					
0	+113		+ 4		+2	0	−103		− 16		−2
		0		−10				+1		−8	
5	113		− 6			5	102		24		
		−1		9	2			3		9	2
10	112		15			10	99		33		
		2		10				3		9	
15	110		25			15	96		42		
		2		9	1			4		8	1
20	108		34			20	92		50		
		4		9				5		7	
25	104		43			25	87		57		
		4		9	+1			5		7	−1
30	100		52			30	82		64		
		5		9				6		7	
35	95		61			35	76		71		
		6		8	0			7		7	0
40	89		69			40	69		78		
		6		7				7		5	
45	83		76			45	62		83		
		7		7				8		5	
50	+ 76		− 83		0	50	− 54		− 88		0
		− 8		− 6				+8		−5	
55	68		89			55	46		93		
		8		6	−1			8		3	+1
60	60		95			60	38		96		
		8		5				9		3	
65	52		100			65	29		99		
		9		4	1			9		2	
70	43		104			70	20		101		1
		9		3				9		−2	
75	34		107			75	11		103		
		10		3	2			9		0	
80	24		110			80	− 2		103		1
		10		1				9		0	
85	14		111			85	+ 7		103		
		9		− 1	2			9		+1	
90	+ 5		112			90	16		102		2
		10		0				9		1	
95	− 5		112			95	25		101		
		10		+ 1				9		3	
100	− 15		−111		3	100	+ 34		− 98		2
		−10		+ 2				+8		+3	
105	25		109			105	42		95		
		9		2	3			8		4	2
110	34		107			110	50		91		
		9		4				8		5	
115	43		103			115	58		86		
		9		4	3			8		5	2
120	52		99			120	66		81		
		9		5				7		6	
125	61		94			125	73		75		
		8		6	3			6		7	2
130	69		88			130	79		68		
		8		6				6		7	
135	77		82			135	85		61		
		7		7	3			5		7	3
140	84		75			140	90		54		
		6		7				4		8	
145	90		68			145	94		46		
		5		8				4		8	
150	− 95		− 60		3	150	+ 98		− 38		2
		− 5		+ 9				+3		+9	
155	100		51			155	101		29		
		5		9	3			2		9	2
160	105		42			160	103		20		
		3		9				1		9	
165	108		33			165	104		11		
		2		9	2			+1		9	2
170	110		24			170	105		− 2		
		2		10				−1		9	
175	112		14			175	104		+ 7		
		− 1		+10	−2			−1		+9	
180	−113		− 4			180	+103		+ 16		+2

180° are to be subtracted from the Arguments > 180°, and ξ_1, η_1, and ζ_1 to be taken with the reversed sign.

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT XVIII.						ARGUMENT XIX.					
Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1	Arg.	ξ_1	Diff.	η_1	Diff.	ζ_1
°						°					
0	+43		+ 5		0	0	+29		+14		−1
		−2		+7				−3		+4	
10	41		12		0	10	26		18		−1
		2		7				4		4	
20	39		19		0	20	22		22		0
		4		7				5		4	
30	35		26		0	30	17		26		0
		5		5				5		2	
40	30		31		0	40	12		28		0
		6		5				5		+2	
50	24		36		0	50	7		30		+1
		7		4				6		0	
60	17		40		0	60	+ 1		30		1
		7		2				6		0	
70	10		42		0	70	− 5		30		1
		7		+1				5		−1	
80	+ 3		43		0	80	10		29		2
		8		0				5		2	
90	− 5		43		0	90	15		27		2
		7		−1				5		3	
100	−12		+42		0	100	−20		+24		+2
		−7		−3				−4		−3	
110	19		39		0	110	24		21		2
		7		4				4		4	
120	26		35		0	120	28		17		2
		5		5				2		5	
130	31		30		0	130	30		12		2
		5		6				2		5	
140	36		24		0	140	32		7		2
		3		7				−1		5	
150	39		17		0	150	33		+ 2		1
		3		7				0		6	
160	42		10		0	160	33		− 4		1
		−1		7				+2		5	
170	43		+ 3		0	170	31		9		1
		0		−8				+2		−5	
180	−43		− 5		0	180	−29		−14		+1

ARGUMENT XX.				ARGUMENT XXI.				ARGUMENT XXII.			
Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1
°				°				°			
0	−27	− 4	0	0	+25	+ 1	0	0	−24	+10	−8
10	26	9	0	10	24	− 3	0	10	21	14	8
20	24	13	0	20	24	8	0	20	17	18	8
30	21	17	0	30	22	12	0	30	13	21	7
40	18	21	0	40	20	16	0	40	9	23	7
50	14	23	0	50	17	19	0	50	− 4	25	6
60	10	25	0	60	13	22	0	60	+ 1	26	5
70	− 5	27	0	70	10	24	0	70	6	26	3
80	0	27	0	80	6	26	0	80	10	25	2
90	+ 4	27	0	90	+ 1	26	0	90	15	23	−1
100	+ 9	−26	0	100	− 3	−26	0	100	+19	+21	+1
110	13	24	0	110	7	25	0	110	22	19	2
120	17	21	0	120	11	24	0	120	25	15	4
130	21	18	0	130	15	21	0	130	26	11	5
140	23	14	0	140	18	18	0	140	28	7	6
150	25	10	0	150	21	14	0	150	28	+ 3	7
160	27	− 5	0	160	23	10	0	160	27	− 2	8
170	27	0	0	170	24	6	0	170	26	6	8
180	+27	+ 4	0	180	−25	− 1	0	180	+24	−10	+8

180° are to be subtracted from the Arguments $>$ 180°, and ξ_1, η_1, and ζ_1 to be taken with the reversed sign.

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT XXIII.				ARGUMENT XXIV.				ARGUMENT XXV.			
Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1
°				°				°			
0	−22	− 2	−1	0	+20	−4	+2	0	−19	+ 1	0
10	22	+ 2	1	10	20	4	1	10	19	4	0
20	21	6	−1	20	18	4	+1	20	18	7	0
30	20	10	0	30	16	3	0	30	16	10	0
40	18	13	0	40	14	3	−1	40	14	13	0
50	15	16	0	50	11	2	2	50	12	15	0
60	12	18	0	60	8	1	2	60	9	17	0
70	9	20	+1	70	+ 4	−1	3	70	6	18	0
80	5	21	1	80	0	0	4	80	− 3	19	0
90	− 1	22	1	90	− 3	+1	4	90	+ 1	19	0
100	+ 3	+22	+1	100	− 7	+1	−4	100	+ 4	+19	0
110	6	21	1	110	10	2	4	110	7	18	0
120	10	20	2	120	13	3	4	120	10	16	0
130	13	18	2	130	16	3	4	130	13	14	0
140	16	15	2	140	18	4	4	140	15	12	0
150	18	12	2	150	19	4	4	150	17	9	0
160	20	9	1	160	20	4	3	160	18	6	0
170	22	5	1	170	21	4	3	170	19	+ 3	0
180	+22	+ 2	+1	180	−20	+4	−2	180	+19	− 1	0

ARGUMENT XXVI.				ARGUMENT XXVII.				ARGUMENT XXVIII.			
Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1
°				°				°			
0	+19	+13	0	0	+16	+11	+3	0	−15	+ 5	+1
10	21	9	0	10	14	7	3	10	14	8	1
20	23	6	0	20	12	+ 2	3	20	13	11	1
30	24	+ 2	0	30	10	− 2	2	30	12	14	+1
40	24	− 2	0	40	7	7	2	40	10	16	0
50	23	6	0	50	4	11	2	50	8	18	0
60	22	10	0	60	+ 1	15	1	60	6	19	0
70	20	13	0	70	− 3	19	+1	70	− 3	20	0
80	17	16	0	80	6	22	0	80	0	19	−1
90	14	19	0	90	9	24	0	90	+ 2	19	1
100	+11	−21	0	100	−11	−25	−1	100	+ 5	+18	−1
110	7	22	0	110	14	26	1	110	7	16	1
120	+ 3	23	0	120	16	26	2	120	9	14	1
130	− 1	23	0	130	17	25	2	130	11	11	2
140	6	22	0	140	18	24	3	140	13	8	2
150	10	20	0	150	18	21	3	150	14	5	2
160	13	18	0	160	18	19	3	160	15	+ 2	2
170	16	16	0	170	17	15	3	170	15	− 2	2
180	−19	−13	0	180	−16	−11	−3	180	+15	− 5	−1

180° are to be subtracted from the Arguments > 180°, and ξ_1, η_1, and ζ_1 to be taken with the reversed sign.

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT XXIX.				ARGUMENT XXX.				ARGUMENT XXXI.			
Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1
°				°				°			
0	+12	+ 1	0	0	−8	−1	0	0	−7	−1	0
10	12	− 1	0	10	8	2	0	10	7	2	0
20	12	3	0	20	7	3	0	20	6	3	0
30	11	5	0	30	7	5	0	30	6	4	0
40	10	7	0	40	6	6	0	40	5	5	0
50	9	9	0	50	5	7	0	50	4	6	0
60	7	10	0	60	4	8	0	60	3	6	0
70	5	11	0	70	2	8	0	70	−2	7	0
80	3	12	0	80	−1	8	0	80	0	7	0
90	+ 1	12	0	90	+1	8	0	90	+1	7	0
100	− 1	−12	−1	100	+2	−8	0	100	+2	−6	0
110	3	12	1	110	3	8	0	110	3	6	0
120	5	11	1	120	4	7	0	120	4	5	0
130	7	10	1	130	5	6	0	130	5	5	0
140	9	9	1	140	6	5	0	140	6	4	0
150	10	7	1	150	7	4	0	150	7	3	0
160	11	5	−1	160	8	2	0	160	7	−2	0
170	12	3	0	170	8	−1	0	170	7	0	0
180	−12	− 1	0	180	+8	+1	0	180	+7	+1	0

ARGUMENT XXXII.				ARGUMENT XXXIII.				ARGUMENT XXXIV.			
Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1
°				°				°			
0	+4	−5	0	0	+3	0	0	0	+3	0	0
10	5	4	0	10	3	0	0	10	3	+1	0
20	6	3	0	20	3	−1	0	20	3	1	0
30	6	2	0	30	3	1	0	30	2	2	0
40	7	−1	0	40	3	2	0	40	2	2	0
50	7	0	0	50	2	2	0	50	2	2	0
60	7	+1	0	60	2	3	0	60	1	3	0
70	6	2	0	70	1	3	0	70	+1	3	0
80	6	3	0	80	+1	3	0	80	0	3	0
90	5	4	0	90	0	3	0	90	0	3	0
100	+4	+5	0	100	0	−3	0	100	−1	+3	0
110	3	5	0	110	−1	3	0	110	1	3	0
120	2	6	0	120	1	3	0	120	2	2	0
130	+1	6	0	130	2	3	0	130	2	2	0
140	0	6	0	140	2	2	0	140	3	2	0
150	−1	6	0	150	3	2	0	150	3	1	0
160	2	6	0	160	3	1	0	160	3	+1	0
170	3	5	0	170	3	−1	0	170	3	0	0
180	−4	+5	0	180	−3	0	0	180	−3	0	0

180° are to be subtracted from the Arguments $> 180°$, and ξ_1, η_1, and ζ_1 to be taken with the reversed sign.

TABLE IV.—*Continued.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT XXXV.				ARGUMENT XXXVI.				ARGUMENT XXXVII.			
Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1
°				°				°			
0	−3	+1	0	0	−2	0	0	0	+2	+ 2	−1
10	3	1	0	10	2	0	0	10	2	4	0
20	3	1	0	20	2	−1	0	20	2	6	0
30	2	1	0	30	2	1	0	30	2	7	0
40	2	1	0	40	2	1	0	40	2	9	0
50	2	+1	0	50	1	2	0	50	2	10	0
60	2	0	0	60	1	2	0	60	2	11	0
70	1	0	0	70	−1	2	0	70	1	11	+1
80	−1	0	0	80	0	2	0	80	1	12	1
90	0	0	0	90	0	2	0	90	+1	11	1
100	0	0	0	100	+1	−2	0	100	0	+11	+1
110	+1	−1	0	110	1	2	0	110	0	10	1
120	1	1	0	120	1	2	0	120	−1	9	1
130	1	1	0	130	2	2	0	130	1	7	1
140	2	1	0	140	2	1	0	140	1	6	1
150	2	1	0	150	2	1	0	150	2	4	1
160	2	1	0	160	2	−1	0	160	2	+ 2	1
170	2	1	0	170	2	0	0	170	2	0	1
180	+3	−1	0	180	+2	0	0	180	−2	− 2	+1

ARGUMENT XXXVIII.				ARGUMENT XXXIX.				ARGUMENT XL.			
Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1
°				°				°			
0	−2	+4	0	0	−2	−2	+2	0	−2	0	0
20	3	4	0	20	2	−1	1	20	2	−1	0
40	4	3	0	40	3	0	1	40	1	1	0
60	4	2	0	60	3	+1	+1	60	−1	2	0
80	3	+1	0	80	2	1	0	80	0	2	0
100	3	−1	+1	100	2	2	0	100	+1	2	0
120	−2	2	1	120	−1	3	−1	120	1	1	0
140	0	3	+1	140	0	3	1	140	2	−1	0
160	+1	4	0	160	+1	3	1	160	2	0	0
180	+2	−4	0	180	+2	+2	−2	180	+2	0	0

180° are to be subtracted from the Arguments $> 180°$, and ξ_1, m, and ζ_1 to be taken with the reversed sign.

TABLE IV.—*Concluded.*

PERTURBATIONS OF THE CO-ORDINATES IN UNITS OF THE SIXTH DECIMAL.

ARGUMENT XLI.				ARGUMENT XLII.				ARGUMENT XLIII.			
Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1
°				°				°			
0	−1	0	0	0	−1	+2	0	0	−1	0	0
20	1	+1	0	20	0	2	0	20	1	0	0
40	−1	1	0	40	0	2	0	40	−1	+1	0
60	0	1	0	60	+1	2	0	60	0	1	0
80	0	1	0	80	1	1	0	80	0	1	0
100	0	1	0	100	2	+1	0	100	0	1	0
120	+1	1	0	120	2	0	0	120	+1	1	0
140	1	+1	0	140	2	−1	0	140	1	+1	0
160	1	0	0	160	1	1	0	160	1	0	0
180	+1	0	0	180	+1	−2	0	180	+1	0	0

ARGUMENT XLIV.				ARGUMENT XLV.			
Arg.	ξ_1	η_1	ζ_1	Arg.	ξ_1	η_1	ζ_1
°				°			
0	−1	+1	0	0	0	0	0
20	1	0	0	20	−1	0	0
40	1	0	0	40	1	−1	0
60	−1	0	0	60	1	1	0
80	0	0	0	80	1	2	0
100	0	0	0	100	1	2	0
120	0	0	0	120	1	2	0
140	0	−1	0	140	−1	1	0
160	+1	1	0	160	0	−1	0
180	+1	−1	0	180	0	0	0

* 180° are to be subtracted from the Arguments $>$ 180°, and ξ_1, η_1, and ζ_1 to be taken with the reversed sign.

TABLE V.

LOGARITHMS FOR REFERRING THE PERTURBATIONS TO THE EQUATOR.

Mean Equinox of the beginning of the Year.

Years.	cos (x_1 x)	cos (y_1 x)	cos (z_1 x)	cos (x_1 y)	cos (y_1 y)	cos (z_1 y)	cos (x_1 z)	cos (y_1 z)	cos (z_1 z)
1852 *B*	9.982316	9.423945*n*	8.944771	9.446013	9.966007	9.400926*n*	8.169765*n*	9.425327	9.983980
1853	9.982289	9.424326*n*	8.944586	9.446346	9.966880	9.400892*n*	8.167022*n*	9.425285	9.983984
1854	9.982261	9.424707*n*	8.944400	9.446679	9.966852	9.400858*n*	8.164265*n*	9.425243	9.983988
1855	9.982234	9.425088*n*	8.944215	9.447012	9.966824	9.400824*n*	8.161488*n*	9.425201	9.983992
1856 *B*	9.982206	9.425468*n*	8.944029	9.447345	9.966796	9.400791*n*	8.158674*n*	9.425159	9.983996
1857	9.982179	9.425848*n*	8.943844	9.447677	9.966768	9.400757*n*	8.155832*n*	9.425117	9.984000
1858	9.982151	9.426227*n*	8.943658	9.448009	9.966740	9.400723*n*	8.152991*n*	9.425075	9.984004
1859	9.982123	9.426606*n*	8.943472	9.448341	9.966712	9.400689*n*	8.150142*n*	9.425033	9.984008
1860 *B*	9.982095	9.426984*n*	8.943286	9.448673	9.966684	9.400656*n*	8.147263*n*	9.424990	9.984011
1861	9.982068	9.427362*n*	8.943100	9.449004	9.966656	9.400622*n*	8.144356*n*	9.424948	9.984015
1862	9.982040	9.427740*n*	8.942914	9.449335	9.966628	9.400588*n*	8.141418*n*	9.424905	9.984019
1863	9.982012	9.428117*n*	8.942728	9.449666	9.966600	9.400554*n*	8.138472*n*	9.424863	9.984023
1864 *B*	9.981984	9.428494*n*	8.942541	9.449996	9.966572	9.400521*n*	8.135514*n*	9.424820	9.984027
1865	9.981956	9.428871*n*	8.942355	9.450326	9.966544	9.400487*n*	8.132548*n*	9.424778	9.984031
1866	9.981928	9.429247*n*	8.942168	9.450656	9.966516	9.400454*n*	8.129549*n*	9.424735	9.984035
1867	9.981900	9.429623*n*	8.941981	9.450986	9.966488	9.400420*n*	8.126521*n*	9.424693	9.984039
1868 *B*	9.981872	9.429999*n*	8.941794	9.451315	9.966459	9.400387*n*	8.123466*n*	9.424650	9.984042
1869	9.981844	9.430374*n*	8.941607	9.451644	9.966431	9.400353*n*	8.120409*n*	9.424608	9.984046
1870	9.981816	9.430749*n*	8.941420	9.451972	9.966403	9.400320*n*	8.117338*n*	9.424565	9.984050
1871	9.981788	9.431124*n*	8.941233	9.452301	9.966375	9.400286*n*	8.114244*n*	9.424522	9.984054
1872 *B*	9.981760	9.431498*n*	8.941045	9.452629	9.966346	9.400253*n*	8.111114*n*	9.424479	9.984058
1873	9.981732	9.431872*n*	8.940858	9.452957	9.966318	9.400219*n*	8.107956*n*	9.424437	9.984062
1874	9.981704	9.432245*n*	8.940670	9.453284	9.966290	9.400186*n*	8.104794*n*	9.424394	9.984066
1875	9.981676	9.432618*n*	8.940483	9.453612	9.966262	9.400152*n*	8.101610*n*	9.424351	9.984070
1876 *B*	9.981647	9.432991*n*	8.940295	9.453939	9.966233	9.400119*n*	8.098387*n*	9.424308	9.984073
1877	9.981619	9.433364*n*	8.940107	9.454266	9.966205	9.400085*n*	8.095134*n*	9.424265	9.984077
1878	9.981591	9.433736*n*	8.939919	9.454592	9.966177	9.400052*n*	8.091878*n*	9.424222	9.984081
1879	9.981563	9.434108*n*	8.939731	9.454918	9.966149	9.400019*n*	8.088597*n*	9.424179	9.984085
1880 *B*	9.981534	9.434479*n*	8.939543	9.455244	9.966120	9.399986*n*	8.085275*n*	9.424136	9.984088
1881	9.981506	9.434850*n*	8.939355	9.455570	9.966092	9.399952*n*	8.081923*n*	9.424093	9.984092
1882	9.981478	9.435221*n*	8.939167	9.455895	9.966063	9.399919*n*	8.078529*n*	9.424050	9.984096
1883	9.981450	9.435591*n*	8.938979	9.456220	9.966035	9.399886*n*	8.075119*n*	9.424007	9.984100
1884 *B*	9.981421	9.435961*n*	8.938790	9.456545	9.966006	9.399853*n*	8.071711*n*	9.423964	9.984103
1885	9.981393	9.436331*n*	8.938602	9.456869	9.965978	9.399819*n*	8.068265*n*	9.423921	9.984107
1886	9.981364	9.436700*n*	8.938413	9.457193	9.965949	9.399786*n*	8.064795*n*	9.423878	9.984111
1887	9.981336	9.437069*n*	8.938224	9.457517	9.965921	9.399753*n*	8.061302*n*	9.423835	9.984115
1888 *B*	9.981307	9.437438*n*	8.938035	9.457841	9.965892	9.399720*n*	8.057762*n*	9.423791	9.984119
1889	9.981279	9.437807*n*	8.937846	9.458164	9.965864	9.399687*n*	8.054192*n*	9.423748	9.984123
1890	9.981250	9.438175*n*	8.937657	9.458487	9.965835	9.399654*n*	8.050612*n*	9.423704	9.984127
1891	9.981222	9.438543*n*	8.937468	9.458810	9.965806	9.399621*n*	8.046982*n*	9.423661	9.984131
1892 *B*	9.981193	9.438910*n*	8.937278	9.459133	9.965777	9.399588*n*	8.043323*n*	9.423617	9.984134
1893	9.981165	9.439277*n*	8.937089	9.459455	9.965749	9.399555*n*	8.039652*n*	9.423573	9.984138
1894	9.981136	9.439644*n*	8.936899	9.459777	9.965720	9.399522*n*	8.035950*n*	9.423529	9.984142
1895	9.981108	9.440011*n*	8.936709	9.460099	9.965691	9.399489*n*	8.032216*n*	9.423485	9.984146
1896 *B*	9.981079	9.440377*n*	8.936519	9.460420	9.965662	9.399456*n*	8.028449*n*	9.423442	9.984149
1897	9.981051	9.440743*n*	8.936329	9.460741	9.965634	9.399423*n*	8.024650*n*	9.423398	9.984153
1898	9.981022	9.441108*n*	8.936139	9.461061	9.965605	9.399390*n*	8.020817*n*	9.423355	9.984157
1899	9.980993	9.441474*n*	8.935949	9.461382	9.965576	9.399357*n*	8.016950*n*	9.423311	9.984161
1900 *B*	9.980964	9.441839*n*	8.935758	9.461702	9.965547	9.399325*n*	8.013048*n*	9.423268	9.984164

TABLE VI.

CONSTANTS FOR THE EQUATOR.

Equator and mean Equinox at the beginning of the Year.

Years.	A′	B′	C′	log sin *a*.	log sin *b*.	log sin *c*.
	° ′ ″	° ′ ″	° ′ ″			
1852 *B*	105 27 14.0	16 46 17.2	356 49 20.7	9.998310	9.985785	9.425935
1853	105 28 3.8	16 47 4.6	356 50 31.7	9.998311	9.985787	9.425945
1854	105 28 53.6	16 47 52.0	356 51 42.7	9.998313	9.985790	9.425895
1855	105 29 43.5	16 48 39.2	356 52 53.8	9.998314	9.985792	9.425844
1856 *B*	105 30 33.4	16 49 26.8	356 54 5.0	9.998316	9.985794	9.425794
1857	105 31 23.2	16 50 14.2	356 55 16.1	9.998317	9.985797	9.425744
1858	105 32 13.0	16 51 1.6	356 56 27.1	9.998319	9.985799	9.425694
1859	105 33 2.9	16 51 49.0	356 57 38.2	9.998320	9.985801	9.425644
1860 *B*	105 33 52.8	16 52 36.5	356 58 49.5	9.998321	9.985804	9.425593
1961	105 34 42.6	16 53 23.8	357 0 0.6	9.998323	9.985806	9.425543
1862	105 35 32.4	16 54 11.2	357 1 11.7	9.998324	9.985808	9.425493
1863	105 36 22.2	16 54 58.6	357 2 22.9	9.998326	9.985811	9.425443
1864 *B*	105 37 12.2	16 55 46.1	357 3 34.2	9.998327	9.985813	9.425392
1865	105 38 2.0	16 56 33.5	357 4 45.4	9.998329	9.985815	9.425342
1866	105 38 51.8	16 57 20.9	357 5 56.5	9.998330	9.985818	9.425292
1867	105 39 41.6	16 58 8.2	357 7 7.7	9.998331	9.985820	9.425242
1868 *B*	105 40 31.6	16 58 55.8	357 8 19.1	9.998333	9.985822	9.425192
1869	105 41 21.4	16 59 43.1	357 9 30.3	9.998334	9.985825	9.425142
1870	105 42 11.2	17 0 30.5	357 10 41.5	9.998336	9.985827	9.425092
1871	105 43 1.0	17 1 17.9	357 11 52.7	9.998337	9.985829	9.425042
1872 *B*	105 43 50.9	17 2 5.4	357 13 4.1	9.998339	9.985831	9.424991
1873	105 44 40.7	17 2 52.8	357 14 15.4	9.998340	9.985834	9.424941
1874	105 45 30.5	17 3 40.2	357 15 26.6	9.998342	9.985836	9.424891
1875	105 46 20.3	17 4 27.6	357 16 37.9	9.998343	9.985838	9.424841
1876 *B*	105 47 10.3	17 5 15.1	357 17 49.3	9.998344	9.985840	9.424791
1877	105 48 0.1	17 6 2.5	357 19 0.6	9.998346	9.985843	9.424741
1878	105 48 49.9	17 6 49.8	357 20 11.9	9.998347	9.985845	9.424691
1879	105 49 39.7	17 7 37.2	357 21 23.2	9.998349	9.985847	9.424641
1880 *B*	105 50 29.7	17 8 24.7	357 22 34.7	9.998350	9.985849	9.424591
1881	105 51 19.5	17 9 12.1	357 23 46.0	9.998352	9.985852	9.424541
1882	105 52 9.3	17 9 59.5	357 24 57.3	9.998353	9.985854	9.424491
1883	105 52 59.1	17 10 46.9	357 26 8.7	9.998354	9.985856	9.424441
1884 *B*	105 53 49.0	17 11 34.4	357 27 20.2	9.998356	9.985858	9.424391
1885	105 54 38.8	17 12 21.8	357 28 31.6	9.998357	9.985860	9.424341
1886	105 55 28.6	17 13 9.1	357 29 42.9	9.998359	9.985863	9.424291
1887	105 56 18.4	17 13 56.5	357 30 54.3	9.998360	9.985865	9.424241
1888 *B*	105 57 8.4	17 14 44.0	357 32 5.9	9.998361	9.985867	9.424191
1889	105 57 58.2	17 15 31.4	357 33 17.3	9.998363	9.985869	9.424141
1890	105 58 48.0	17 16 18.8	357 34 28.7	9.998364	9.985871	9.424091
1891	105 59 37.8	17 17 6.2	357 35 40.2	9.998366	9.985874	9.424041
1892 *B*	106 0 27.7	17 17 53.7	357 36 51.8	9.998367	9.985876	9.423991
1893	106 1 17.5	17 18 41.1	357 38 3.2	9.998369	9.985878	9.423941
1894	106 2 7.3	17 19 28.5	357 39 14.7	9.998370	9.985880	9.423891
1895	106 2 57.2	17 20 15.9	357 40 26.2	9.998371	9.985882	9.423841
1896 *B*	106 3 47.1	17 21 3.4	357 41 37.8	9.998373	9.985884	9.423792
1897	106 4 36.9	17 21 50.8	357 42 49.4	9.998374	9.985886	9.423742
1898	106 5 26.7	17 22 38.1	357 44 0.9	9.998376	9.985888	9.423692
1899	106 6 16.5	17 23 25.5	357 45 12.4	9.998377	9.985890	9.423642
1900 *B*	106 7 6.5	17 24 13.0	357 46 24.1	9.998379	9.985893	9.423592